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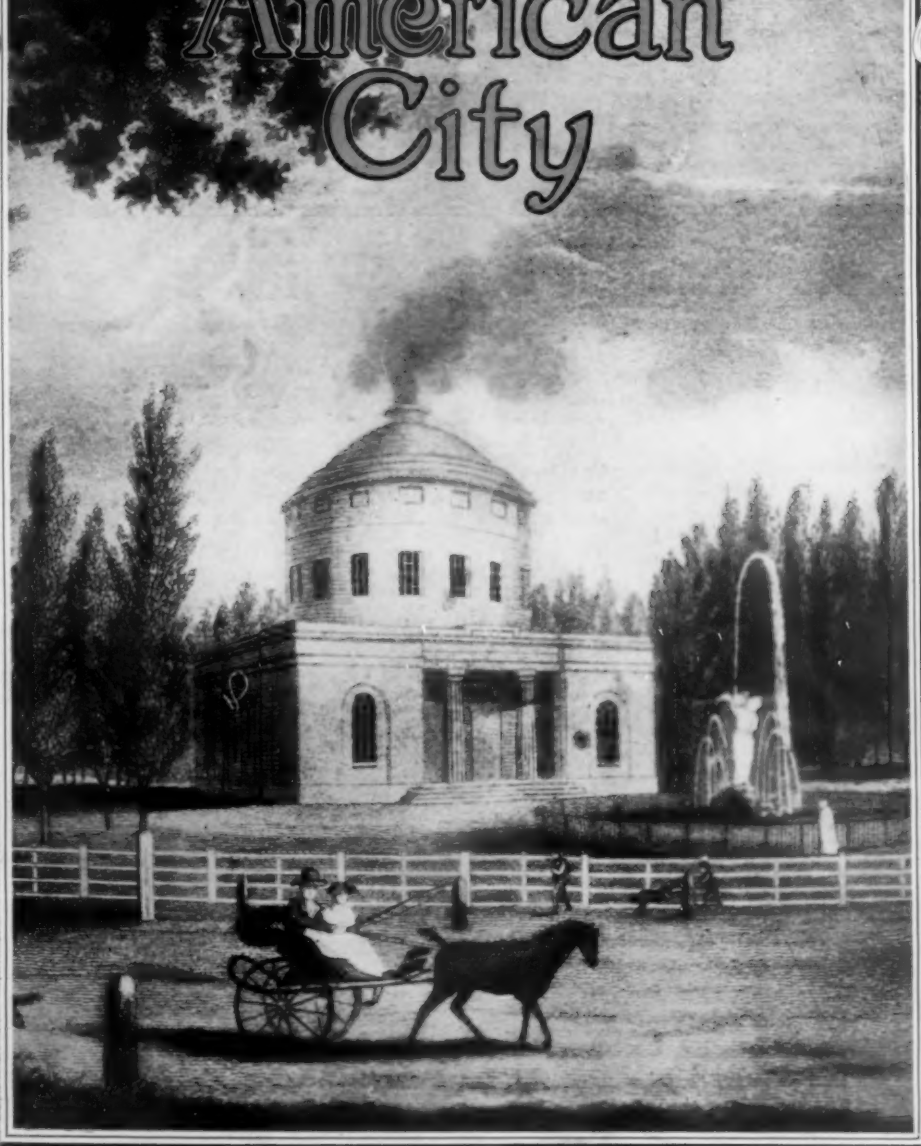
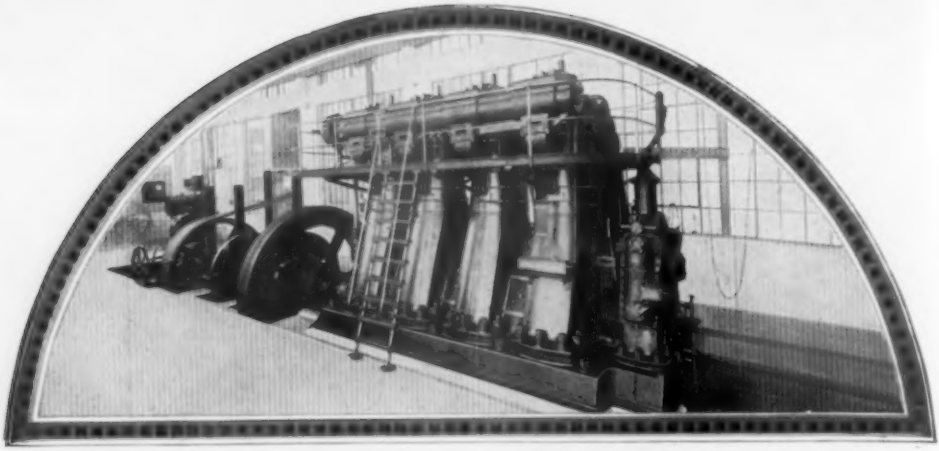
The American City



THE OLD CENTER SQUARE PUMPING STATION, PHILADELPHIA

This station was located on the site of the present City Hall. Both the pumping unit and the boiler were built almost entirely of wood. This primitive plant is in great contrast to the forty-million-gallon turbine pump at the present Queen Lane Station



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For all power purposes in units from 150 to 1000 horsepower.
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Diesel—30% net.
Fuel consumption in direct proportion to load.
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Constant readiness for operation without stand-by losses.
Quick and easy starting.
Economy independent of size.
Long life with constant efficiency.
Easily operated and maintained by any competent steam engineer.

Our new bulletin No. 801, describing and illustrating the Fulton Diesel Engine and containing other valuable information, will be mailed upon request.

FULTON IRON WORKS COMPANY, St. Louis, U. S. A.

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Volume XXVI Number 5

The American City Magazine

New York May 1922

The Business of Water-Works Management—Part I

By George A. Johnson
Consulting Engineer, New York City

This article avoids the more abstruse technical phrases which easily enter into discussions of charges for water service. The author realizes the difficulties experienced by municipally owned water departments in obtaining rates and appropriations sufficient to permit entirely satisfactory water service to be given at all times. He explains the requirements involved in this most essential public utility and shows how each individual taxpayer should become an understanding partner in the enterprise which gives him, without unnecessary or inequitable cost, constant, safe and reliable service in the second of the three chief essentials of human existence.

IN the management of municipal business no other essential element is so incompletely understood by the taxpayer as is the charge for water service. Water departments often work from hand to mouth, matching expenditures against appropriations made by budget committees that all too frequently fail to sense the real needs of those departments and that always have one alert eye on the sum total of the budget.

Innumerable articles on the subject of water-rates have been prepared by water-works engineers. Most of them have been written around difficulties experienced by privately owned water companies in returning from the business a revenue satisfactory to their stockholders. There is no question that it was formerly an up-hill job for private utilities to get what they considered equitable rates permitting them to render competent service and at the same time obtain a fair net return on their business. Latterly public service commissions have been instrumental in aiding private interests to get higher rates, but in the majority of instances this result has been accomplished against the will of the taxpayer and without the prosecution of intelligent campaigns of public education respecting the necessity, fairness and equity of such procedures. Many cases have been dragged into the courts which could just as well have been kept out of them by adequate, and at the same time simple, explanation of the controlling phases of the problem involved, such as could readily be comprehended by the man who had to stand the raise and pay the bill, namely, the humble taxpayer and consumer.

The proper management of a municipally owned water-works system is a mere matter of business, just as is the management of a privately owned water-works system. To

render a public service costs money, and to render it to the entire satisfaction of the community costs more money. This service must be paid for by every taxpayer, and the points at issue resolve themselves into what in the last analysis are simple considerations, namely:

1. What is the character of the service required, to give to the community an adequate supply of water, safe for primary purposes, satisfactory for industrial uses, and supplied under the pressures required by local controlling conditions?

2. What is the cost of rendering such service, giving due consideration not only to the debt outstanding against the water-works system, but also to the cost of future extensions and maintenance, and presupposing competent and economical management in all departments?

With these essential bases established, the solution of the problem is an elementary consideration. There must be an equitable balance established between demand and supply. Service of a certain character is required and costs so much money. Water-rates must be adjusted so as to obtain the necessary total revenue to meet those costs. With the two cardinal points definitely determined, it is just as improper for a community to run its self-owned water-works system at a loss as it is to expect the investors in a privately owned water-works system to forego the basic consideration of a fair return from the enterprise in which they have placed their money.

In the adjustment of water-rates to each character of service the fundamental considerations are equally simple. An inequitable burden cannot properly be placed upon industrial establishments any more than it is likely to be accepted without protest by the consumers of small but quite constant daily volumes of water. Every reasonable consideration must be given to the manufacturer who constitutes the financial backbone of the community's prosperity; for, with an unbalanced and abnormally high water-rate, his costs of production are thrown out of proportion, and he is then placed under an unnecessary and unwarranted handicap. This may force him to develop a water-supply from a private source, or to move his factory elsewhere. All this means lost revenue to the community, not only in its water department, but in the unemployment of its people.

Bases for Rate-Making

In establishing a scale of rates for water service, consideration must first be given to an estimate of the cost of production of that service. Arriving at the total, and adding to that a reasonable factor of safety, the municipality takes its next step in adjusting the charges for various classes of service so as to give every consumer a fair deal.

The cost of rendering service may be summed up from the following main items:

(a) Bonded indebtedness, represented by that sum of money required annually to retire outstanding bonds, and for interest on the existing debt

(b) Annual overhead charges for administration, including rentals, taxes, insurance and legal expenses; salaries and wages of the force required for operation and maintenance of the system; and a suitable sum for supplies and materials required for ordinary operation, maintenance, repairs and replacements

(c) Working capital or reserve fund

The first item is a definite and fixed charge, which needs no explanation. The second item requires, first, the presupposition that the administrative force is cut to the minimum capable of rendering competent service. Taxes, rentals and insurance charges are amenable to practically no argument. Legal expenses ordinarily are merely nominal. Salaries and wages are governed by law or local regulations or customs. The practice of laying in a stock of supplies and materials at annual intervals makes for stability of the budget. This item will vary from year to year, depending upon prevailing prices and upon the predicted requirements of the time, chiefly as regards needed repairs and renewals which can be competently predicted well in advance by an efficient administrative and operating staff. The working capital, or reserve, is one made up of annual allotments toward a fund of considerable size which will be needed for relatively expensive replacements or extensions at some time in the future, and which can also be predicted with reasonable accuracy. If no such reservation is made, then when the necessity of making such improvements comes, it is the common custom to raise the necessary money by special bond issue. This made, the annual charge for interest on, and retirement of, the new bonds becomes a fixed charge to be added to the charge on the old debt.

The Pay-As-You-Go Policy

To function properly and with the least possibility of friction with the community, a water department can best take care of the majority of new bond issues by predicting future replacements and extensions well in advance and laying aside annually enough money to defray such extraordinary expense when the time of need arrives. Thus each generation will care for its own requirements at its own expense, instead of unpreparedly awaiting the inevitable hour when it will be necessary to go to the taxpayers for their voted approval of a new bond issue to meet the cost of sadly needed extensions and improvements for which the coming generation must pay.

The present generation frequently protests against the necessity of paying for improvements made by the preceding generations who tried to anticipate the requirements of their successors. It were far better that each generation should care for itself, and pay as it goes.

In the operation of such a plan of continuous financing, it is more than ever necessary that by sound legal enactments the surplus funds of the water department shall be rendered inviolable except for their first intended uses, namely, the anticipated improvements in the water-works system for which such funds are constantly being built up. Furthermore, water departments should be absolutely divorced from politics. Men who have proved their competence by actual service should not be subject to removal for any other cause than unfaithfulness to their duties. Certainly, municipal water departments should never be made the chess-boards of political leaders, the happy hunting-grounds of incompetent men who have been faithful to their party, or a repository for the representatives of potential votes.

That the pay-as-you-go policy set forth above will not meet with the approval of many students of, and authorities on, water-works financing, the author is perfectly well aware, but the thought is advanced on the ground that, once inaugurated at the expense, perhaps, of the living generation, the burden thereafter is distributed just as equitably as ever before. The present generation thus cares for its own needs, and at least the incipient requirements of each future generation, without necessitating any further bond issues, except perhaps for some manifestly important work that could not well be anticipated in advance, such as those occasioned by annexation of new areas. The water department is made a continuously self-supporting institution that will not need to appeal to the taxpayers for their approval of new projects of extension and betterment. To obtain the taxpayers' support of such enterprises, extended campaigns of education are usually required. It is necessary to convince the voters that the improvements are really needed, and that their consummation will result in more economical management and better service. Such facts are extremely difficult to impress upon the minds of taxpayers to the degree required in order to obtain their affirmative votes.

Bond issues innumerable have failed for this elementary reason. Worn-out, inefficient and costly-to-operate pumping machinery, mains of inadequate carrying capacity, insufficient reserve storage, incomplete metering, and other deficiencies in water-works systems have been kept in service because the public would not vote the necessary authority to raise by new bond issues the required funds to correct them. This has resulted in poor and uneconomical service, and in increased fire hazard and insurance rates, and all because of the taxpayers' lack of comprehension of the proper needs of the water department. Very often, indeed, the money wasted in a relatively short period on account of the forced continuance of an inadequate and inefficient system would easily have defrayed the cost of the needed improvements, and the community would all the time have enjoyed better service and adequate protection against fire hazard.

Twenty years ago it was a herculean task to impress the average taxpayer that purification of his surface water-supply was needed for the conservation of his health and comfort. To get him to agree to contribute for himself and each member of his family half a dollar or so each year to defray the cost of such purification of the water-supply of his community, was a hopeless undertaking.

Editorial Note.—This article will be continued in the June issue of THE AMERICAN CITY, *covering classes of service, adjustment of rates, and a business basis for water-works management.*

Making a Municipal Light and Water Plant Pay

Low Electric and Water Rates Made Possible Through Efficient Management

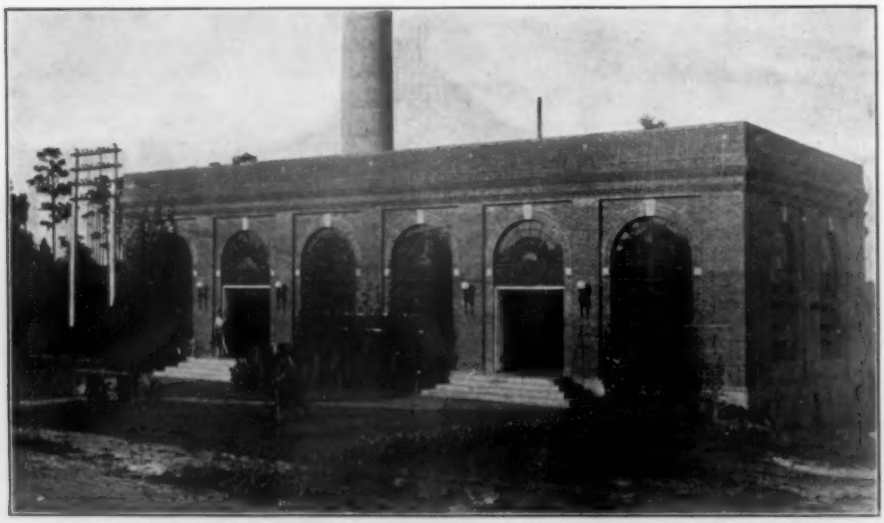
By G. H. Cairns
City Manager, Gainesville, Fla.

THE municipal light and water plant constructed in 1913 at Gainesville, Fla., has consistently proved that a publicly owned utility in a town of 5,000 can deliver good service to its patrons at a very low rate and at the same time be a source of revenue to the city.

At the time the plant was built and placed in operation, the peak load was hardly more than half of the capacity of the plant. The demand for power has so increased, however, that the present equipment is 20 to 35 per cent overloaded and work is being rushed to install a 500-kilowatt turbo-generator. Additional pumping equipment will also be installed shortly.

The operation of the plant, with that of all other public utilities, was in the hands of the Board of Public Works until June, 1921, when the management of nearly all the city departments, including the water and light plant, was given to the City Manager.

As a revenue-producer, the plant has shown up more favorably each year, so that at present the margin of profit is considerable without in any way lowering the grade of service to the consumers. The recent savings have been made possible by co-ordinating the several departments so that they function more efficiently and eliminate unnecessary overhead expense.



EXTERIOR OF THE GAINESVILLE, FLA., MUNICIPAL POWER-PLANT

In spite of the fact that Gainesville is one of the smallest cities in Florida, it has about the lowest rates quoted in the state and is not supported by any supplementary funds from reserve or taxation. With the growth of the city and the extensive building since the war period, the plant has been obliged to make additions which in most cases would have caused plants to borrow capital or raise the rates. This plant, however, has

met all the requirements in the way of extensions in the face of the rise of fuel oil from $1.17 to $1.72 per barrel, and has furnished current for lighting purposes on a sliding scale that averages less than 7 cents per kilowatt hour. For power the average rate is about 4 cents per kilowatt hour, and the heating rate is 2½ cents per kilowatt hour flat. The minimum charge in all cases is $1 per month for electricity or for water. In the case of water rates, an allowance of 24,000 gallons per quarter is made for the minimum charge of $3. In the sale of water to all types of services the rate drops to 10 cents per 1,000 gallons after 40,000 gallons have been used in the three-months period.

Brick Pavement Reconstruction in Meridian, Mississippi

By John C. Watts
City Engineer, Meridian, Miss.

LAST summer in Meridian, Miss., some 7,500 square yards of brick pavement were relaid with brick which had originally been laid on the same street 23 years before. During the 23 years the bricks were in service they had been subjected to severe traffic conditions. Twenty-second Avenue, the street referred to, was laid in the fall of 1898 under the direction of the late Waldo G. Myers, then City Engineer. The bricks were laid with a 2-inch sand cushion on a 6-inch slag cement base of 1:2:5 mix. Sand filler was used in the joints, and the contract price was $1.80 per square yard.

For years this type of construction held up without a flaw. The traffic could be termed "heavy" from the start, but in later years it became exceedingly heavy on this particular thoroughfare. Gradually, because of the further compacting of the sand cushion in some instances, and in others because of the wearing of the brick, which obviously were laid before the modern methods of testing brick were established, depressions appeared in the surface.

It became evident in 1921 that steps should be taken to improve the condition of the surface and preserve the street. The Engineering Department of the city advised

A STREET REPAVED WITH OLD BRICK—INSET SHOWS CONDITION BEFORE RELAYING

reconstruction and suggested that the same brick be relaid on a repaired base. Bonds were voted by the city and specifications prepared by the Street Department. After bids had been received, the work was awarded to the Southern Paving and Construction Company of Chattanooga, Tenn., at 65 cents per square yard.

The bricks were taken up and stacked along the curb line. The sand cushion was re-raked, depressions filled in, compacted and raked over, and then the entire surface was thoroughly compacted. The bricks were then relaid flat and rolled with a 3-ton roller. The joints were filled with asphalt filler at the rate of about 2 gallons of asphalt per square yard, according to the specifications of the National Paving Brick Manufacturers Association. This pavement as relaid has been very satisfactory, giving an even surface, and should last for at least another 23 years.

A rather unusual accident occurred on Twenty-second Avenue shortly after it was paved, demonstrating the durability of a 3-inch brick wearing surface laid with asphalt filler on a gravel base. At the point referred to, Twenty-second Avenue runs through the railroad yards and is subjected to heavy trucking. One night heavily loaded box cars were backed too vigorously against the bumper beside the street. The cars crashed over the sidewalk onto the avenue and across to the opposite side of the street with such force as to crush the sidewalk and granite curbing on both sides. Neither the 6-inch rolled gravel base nor the 3-inch brick showed any ill effects of the tremendous weight of the loaded cars except at the point of greatest impact, where the wheels dropped nearly a foot from the curb to the pavement. A bare trace of the steel-flanged wheels is noticeable the entire distance across the pavement, and even this marking is mainly due to the thin layer of asphalt filler remaining on the surface of the bricks.

Census Bureau Revises City Finance Data

Revised figures just received from the Census Bureau make necessary the following corrections in the tables printed in the April issue of THE AMERICAN CITY:

State and City	Per Capita Cost	Per Capita Receipts	Per Capita Surplus	Deficit	Per Capita Debt Minus Sinking Fund Assets 1920	1917	1914	Form of Government
Alabama								
Mobile	19.25	18.75	....	.50	50.45	50.21	56.19	
Massachusetts								
Lawrence	36.31	40.95	4.64	.....	34.04	30.04	28.21	
New Bedford	51.59	45.84	....	5.75	72.92	75.07	74.98	
New Jersey								
Hoboken	79.22	39.94	....	39.28	115.31	59.72	44.21	Commission
Passaic	29.77	25.16	....	4.61	50.61	46.57	43.58	Commission
Perth Amboy	57.98	36.53	....	21.45	74.67	53.62	38.83	Council

Standard Specifications for Pressure Water Filters

Specifications Adopted by Associated Manufacturers of Water Purifying Equipment Are Recommended for Consideration

IN the standard specifications for pressure water filters recently adopted by the Associated Manufacturers of Water Purifying Equipment, the rates of filtration are based upon the "Report of Committee on Recommended Standardization of Filters" of the American Society of Mechanical Engineers, presented at its annual meeting, December, 1916. This report fixes the rate of filtration for potable water as follows:

"Whenever the water is to be used for domestic purposes or to secure full bacterial purification, the capacity shall be based upon a rate of filtration not to exceed 2 gallons per minute per square foot of filtering area, and a coagulant must be used."

A full report of the Committee is con-

tained in the Transactions of the A. S. M. E. for 1917, pages 425-432.

Rates of filtration for various uses should conform to the following schedule:

2 gallons per square foot per minute for all supplies used for drinking, or for the preparation of food products.

2 to 4 gallons per square foot per minute when filtering a treated municipal supply of approved bacterial purity.

2 to 4 gallons per square foot per minute for swimming pools and for all industrial uses.

2 to 5 gallons per square foot per minute as conditions may warrant for double filtration, using sand followed by charcoal where reduction of color, odor, taste, or certain forms of iron is desired. This method of filtration not to be applied for bacterial purification.

DIMENSIONS AND CAPACITY DATA FOR STEEL AND CAST IRON PRESSURE FILTERS—SPECIFICATIONS RECOMMENDED BY THE ASSOCIATED MANUFACTURERS OF WATER PURIFYING EQUIPMENT

Capacities per Min. for Rates of 2, 3 and 4 Gal. per Sq. Ft. per Min.

Filters Standard Sizes Dia.	Area	2 Gals. Per Square Foot	3 Gals. Per Square Foot	4 Gals. Per Square Foot	Pipe Connections: Inlet P. Wash	Pipe Connections: Outlet to Sewer	Min. Wash Water at 12 Gals. Per Sq. Ft. Per Min.
12″	.785	1.57	2.35	3.04	¾″	1″	9.42
14″	1.06	2.12	3.18	4.24	1″	1¼″	12.72
16″	1.39	2.78	4.17	5.56	1″	1½″	16.68
20″	2.18	4.36	6.54	8.72	1½″	1½″	26.16
24″	3.14	6.28	9.42	12.5	1½″	2″	37.
30″	4.90	9.8	14.7	19.6	1½″	2″	60.
36″	7.06	14.1	21.1	28.2	2″	2½″	84.
42″	9.62	19.2	28.8	38.5	2″	2½″	115.
48″	12.56	25.1	37.6	50.2	2½″	3″	150.
54″	15.90	31.8	47.7	63.6	2½″	3″	190.
60″	19.63	39.2	58.8	78.5	3″	4″	235.
72″	28.27	56.5	84.8	113.1	4″	5″	339.
84″	38.48	76.9	115.4	153.9	4″	5″	460.
96″	50.27	100.5	150.8	201.1	5″	6″	600.

L = overall length of filter, and area of bed is calculated for surface of bed 18″ above center of shell.
Area of segments of the 2 dished heads = 9.2 sq. ft.
Area per lineal foot of bed in the cylinder = 7.42 sq. ft.
Example: 8′ x 16″ filter area per head = 9.2 sq. ft.
Area in cylinder 14 x 7.42 = 103.9.
Total effective area = 113.1 sq. ft.

Horizontal Filters							
8′ x 10′ L	68.5	137.	205.5	274.0	6″	8″	822.
8′ x 12′ L	83.4	166.8	250.2	333.6	6″	8″	1000.
8′ x 14′ L	98.2	196.4	294.6	392.8	6″	8″	1178.
8′ x 16′ L	113.1	226.2	339.3	452.4	8″	10″	1357.
8′ x 20′ L	142.7	285.4	428.1	570.8	8″	10″	1712.
8′ x 25′ L	179.8	359.6	539.4	719.2	8″	10″	2157.

Construction of Steel Pressure Filters

Standard manholes 11 x 15 inches, or 10 x 16 inches.
Tensile strength of steel plate 55,000 lbs. to 65,000 lbs.
Heads dished to radius of diameter of tank
Hydrostatic test 50 per cent in excess of working pressure

Vertical Steel Filters

Dia.	Working Pressure 75 pounds per sq. in. Shell Min. Eff. Joint	Shell Thickness	Head Thickness	Working Pressure 100 pounds per sq. in. Shell Min. Eff. Joint	Shell Thickness	Head Thickness	Working Pressure 125 pounds per sq. in. Shell Min. Eff. Joint	Shell Thickness	Head Thickness
24″	50%	3/16″	¼″	50%	3/16″	¼″	50%	¼″	5/16″
30″	50	3/16″	¼″	57	¼″	5/16″	50	5/16″	5/16″
36″	50	3/16″	¼″	57	¼″	5/16″	70	¼″	⅜″
42″	57	¼″	5/16″	70	¼″	⅜″	70	5/16″	7/16″
48″	57	¼″	5/16″	70	¼″	⅜″	70	5/16″	7/16″
54″	57	¼″	5/16″	70	5/16″	7/16″	70	⅜″	½″
60″	57	¼″	⅜″	70	5/16″	7/16″	67	7/16″	½″
72″	72	¼″	⅜″	69	⅜″	½″	66	½″	9/16″
84″	70	5/16″	7/16″	66	½″	9/16″	66	9/16″	11/16″
96″	69	⅜″	7/16″	68	½″	⅝″	68	⅝″	¾″

Cast Iron Pressure Filters

To be gray iron casting having a tensile strength of approximately 20,000 pounds per square inch.
Hydrostatic test 50 per cent in excess of working pressure to be applied.
Heads dished to radius equal to diameter of shell may be modified with rib reinforcement to same thickness as shells.
Variations of ⅛″ in these thicknesses of shells and heads and flanges to be permissible.

Filter Dia.	65-Pound Working Pressure: Shell Thickness	65-Pound Working Pressure: Head and Flange Thickness	100-Pound Working Pressure: Shell Thickness	100-Pound Working Pressure: Head and Flange Thickness
12″	5/16″	5/16″	5/16″	7/16″
14″	5/16″	7/16″	11/16″	15/16″
16″	5/16″	7/16″	11/16″	15/16″
20″	11/16″	15/16″	¾″	1″
24″	11/16″	15/16″	13/16″	1-1/16″
30″	¾″	1″	7/8″	1⅛″
36″	13/16″	1-1/16″	15/16″	1-3/16″
42″	13/16″	1-1/16″	1″	1¼″
48″	7/8″	1-⅛″	1-1/16″	1-5/16″

Water-Works Supply Men Help Superintendents

Sales Interviews Highly Educational If Taken in Proper Spirit

AT the March meeting of the New York Section of the American Water Works Association, Beekman C. Little, former President of the American Water Works Association, and Superintendent of the Rochester, N. Y., Water Works, gave a most interesting and instructive talk on the value of the water-works supply man to the superintendent.

Mr. Little has found in his prolonged dealings with the water-works supply men that they often give much more than they get in value received. Most, if not all, of the well-known supply men have ideas and ideals beyond the mere making of money from their products. There are many interesting examples of the results of research and study by manufacturers of water-works supplies. Among them may be noted the preparation of a substitute for lead for jointing cast iron water-mains; vast improvements in water-meters; the now well-known fire line meters and improved fire hydrants.

In addition to mentioning the value of these products of manufacturers, Mr. Little laid stress on the service organizations whose help has meant much to water-works superintendents. A typical example is the company which cleans water-mains, thus saving much money for various communities, besides preserving some of the pipes and supply mains which otherwise would have been abandoned or replaced. By its work this company has bettered health statistics and prevented the destruction of considerable property by fire. The idea and the method followed in this work are the result of considerable technical knowledge and mechanical ingenuity. The superintendent gets much more in results from contact with these men than appears in the mere labor of cleaning the mains.

The water-waste survey men are being recognized as very necessary adjuncts to water-supply systems. The older and larger the system, the better and more valuable the work they can and do accomplish. Water-works superintendents should get over the idea that it is only the poorly constructed or inefficiently managed water plant which can be bettered by such a survey. Almost any sane-minded water-works superintendent will admit that a properly constructed growing water system can lower its consumption considerably by metering. Even a good water-works system, 100 per cent metered, can be immeasurably improved by a well-conducted water-waste survey.

Water-works superintendents are amazed at the amount of waste discovered by these surveys in plants efficiently managed. They know how much water is being sent through the system and from how much of this revenue is derived. There is, of course, a discrepancy. An estimate is made that a great quantity is used in sprinkling and washing down the many miles of brick and asphalt streets and in flushing sewers and in street contract work. A considerable percentage is allowed for public drinking fountains and watering troughs. A certain percentage is unmetered water used in park systems, and the under-registration of meters is blamed for some of the other unaccounted-for water. Hydrants and valves are kept in good repair, and large and small breaks are attended to as soon as they give evidence of their presence, and so the average water-works superintendent, until recently, considered that other leaks, if any, were unimportant. Mr. Little himself was rather skeptical about a water-waste survey in Rochester, N. Y., as that city is 100 per cent metered and its per capita consumption only about 90 gallons daily, which is about as low as the larger cities can hope to get with the extravagant use of water prevalent in these days.

In Rochester a contract was let for a small section covering about one-eighth of the system. This first contract resulted in shutting off a waste of water of over 1,000,000 gallons per day, with other incidental benefits, and the leaks and broken mains repaired would not have been discovered otherwise except incidentally.

Planning the City's Lighting

By L. A. S. Wood

AN ornamental street lighting system that affords adequate illumination at night, and is inconspicuous in the daytime, harmonizing closely with the general scheme of architecture in the various parts of the city, is a source of municipal pride. The beauty of a city's thoroughfares is not apparent at night unless they are properly illuminated.

Proper lighting requires that the intensity of illumination be varied to meet the requirements of the different sections of the city. Streets and avenues in the business districts, where the traffic is heavier, for instance, require more light than those in the residential districts. The right amount of illumination is as necessary for effective street lighting as is the right method of illumination.

Disregard of this principle is particularly noticeable where large business concerns, or groups of them, have at different times installed various ornamental street lighting systems. Such an indiscriminate selection results in illumination of varying degrees of intensity, and also in many different styles of ornamental posts along the same street and often on adjacent properties. In order to avoid this haphazard scattering of illumination throughout the city, electrical engineers have turned their attention toward designing uniform systems of ornamental street lighting.

The Single-Light Post

One of the best results of the adoption of the present-day high-efficiency gas-filled incandescent lamp has been the development of many artistic and harmonious designs in ornamental posts using a single high-power lamp. In the past, ornamental post lighting has been accomplished by means of cluster posts, using two, three, four or five small lamps on one post. These small lamps were inefficient and the system was expensive because of the large amount of energy required for their operation and the high replacement cost of lamps and glassware. Cluster posts have also the disadvantage of being only partly illuminated at times because of lamps burning out. The largest lamps, as used in the single-light post, are much more efficient than those used in the cluster post.

In addition to its many advantages from an operating standpoint, the single-light post is admittedly superior in appearance to the cluster post, adding to the beauty of the street under both day and night conditions. It relieves the street of the crowded appearance resulting from too many small lamps and gives an effect of elegance, combined with illuminating efficiency of the highest order.

The installation of a good lighting system is something that demands considerable thought and planning. Not alone the lighting system, but also the ornamental posts, the kind and shape of glassware, and the proper placing of the posts, must be given careful study.

There are many streets and driveways which are beautifully lighted at night but which lose all of their pleasing appearance by day. This may be explained by studying the lamp-posts. It will be found that the posts installed are huge and clumsy and poorly located, and do not harmonize at all with their surroundings; such posts, in fact, mar the entire aspect of the street by day.

Different Requirements for Different Sections

Different kinds of street lighting must, of course, be installed in different sections of the city. That which would be appropriate for the business section would not necessarily be suitable for the residential district or the driveways, and vice versa. Generally speaking, city streets may be divided into four classes according to the intensity or amount of light required and the type of equipment usually employed:

Main business streets
Minor business streets
Residence streets
Byways and outlying districts

Main and minor business streets are usually brilliantly lighted with ornamental posts spaced at intervals of 50 to 75 feet, symmetrically arranged opposite each other on either side of the street, the size of lamp,

A WELL-LIGHTED BUSINESS THOROUGHFARE

spacing distance and mounting height being determined by the relative importance of the streets.

In the residence districts, a staggered arrangement is usually adopted for the ornamental posts, with wider spacing and smaller lamps, the main object being to furnish enough light to see by. It must be possible for pedestrians to make their way about at night without inconvenience or danger from accident or attack. The outlying district or byways, where traffic is light, may be illuminated with streethoods suspended from brackets, mast arms or cables, as local conditions require. Streethoods have been used to a great extent in the past without glassware and, while the appearance of the bare lamp was not objectionable, when the lamp used was of the vacuum type, the glare from the bare "gas-filled" lamp was very unpleasant and often proved dangerous in its dazzling effect. Modern practice recommends the use of diffusing or refracting glassware with streethoods equipped with special type "C" lamps to soften the glare or to direct the light into the useful plane.

In many cities, there are some exceptionally wide streets or important boulevards, and these require special treatment. Usually lamps of higher intensity than those used in the main business sections are used, and the mounting heights are increased. This type of lighting is known as "Super White Way" lighting, and single and duplex posts, varying in height from 18 to 22 feet, have been designed to meet these special requirements.

The desirability of using lamps of adequate size cannot be too strongly stressed. It is very poor economy, when designing an ornamental street lighting installation, to attempt to save on the maintenance cost of the system by using small lamps. The investment in posts, cable and equipment is practically the same for all sizes of lamps, and the increased maintenance cost of the higher candle-power lamps is comparatively small as compared with the increased candle-power.

The ornamental lighting unit, or post top, is generally designed so that a large part of the light is directed to the surface of the street or sidewalk, although there should be enough light thrown in an upward direction to illuminate the façades of the buildings. When diffusing glassware is used, the globe should be of sufficient

density to conceal the lamp filament and soften the light without greatly reducing the efficiency of the unit. The entire top should be designed in such a manner as to direct the maximum of useful light to the plane of illumination and at the same time present a distinctive and ornamental appearance.

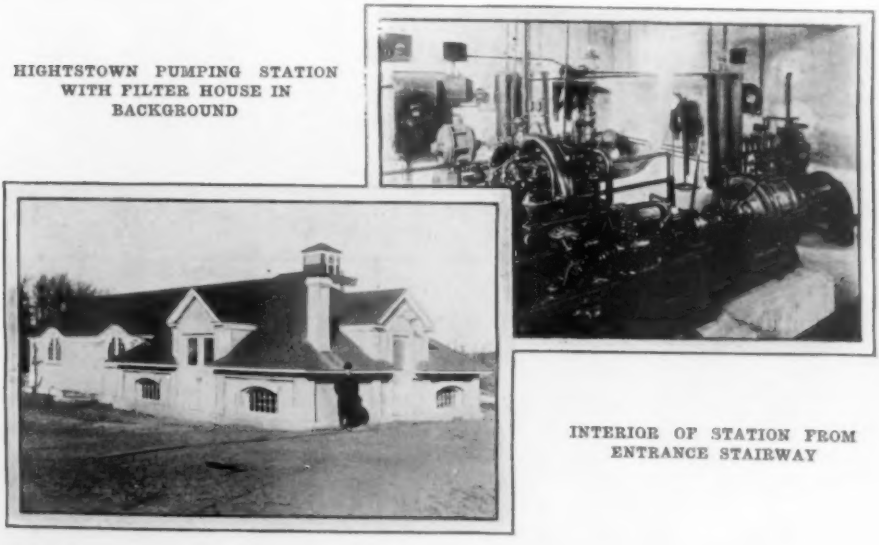
All the foregoing recommendations should be kept in mind by city lighting planners if they are to get the highest efficiency from their street lighting system and also keep the cost of maintenance down to the lowest figure. A well-designed ornamental street lighting system pays large dividends in the form of enhanced real estate values. It attracts the favorable attention of visitors and adds to the desirability of the city as a place in which to live.

Iron-Removal Plant and New Pumping Station at Hightstown, New Jersey

By Waldo S. Coulter
Consulting Engineer, New York City

A NEW pumping station, embodying a closed-system iron-removal plant, was recently placed in operation at Hightstown, N. J. The iron-removal end is of a type unusual in this country, as it disposes altogether of aeration and double pumping, the water being withdrawn from a battery of wells by direct-suction draft and forced into the system through pressure filters by a single operation. The removal of iron and free carbon dioxide is effected by the injection of a dose of lime into the main suction pipe. Reaction with the free carbon dioxide and ferrous carbonate occurs, resulting in the production of calcium carbonate and ferrous hydrate, which are intercepted at the surface of the sand in the filters. The hardness of the water is increased; in this case from a total hardness of 25 to 35 p. p. m., calcium carbonate equivalent, to about 60 to 75 p. p. m. The treated water is therefore what might be termed a medium water.

The cost of lime at Hightstown amounts to about ½-cent per thousand gallons. This is for a raw water containing about 45



HIGHTSTOWN PUMPING STATION WITH FILTER HOUSE IN BACKGROUND

INTERIOR OF STATION FROM ENTRANCE STAIRWAY

p. p. m. of free carbon dioxide and 5 parts of iron.

To secure a direct-suction draft from the battery of wells, and avoid the expense of an air-lift system, the floor of the pump house is depressed. The filters are installed above the ground surface.

The Pumping Equipment

To keep down the cost and secure machinery light enough to operate without special heavy foundations, centrifugal pumps are used. One is direct-connected to an electric motor by a flexible coupling, for regular operation, and the other is similarly connected to a 4-cylinder Van Blerck engine, modified for kerosene. Special provisions have been made to automatically intercept and release air and gas in the main suction and pump casings. These, with an automatic primer, enable the centrifugals to draft smoothly and reliably from the wells through long suction piping, and with a suction lift.

Hydrated lime is measured and fed by a dry-feed machine, mixed with an automatically regulated supply of water in a suction tank and drawn into the main suction by action of the tank. The station is provided with a Venturi meter and indicator-recorder, a recording pressure-gage and other measuring devices. It has inside fire protection and electric lighting and is heated by stoves.

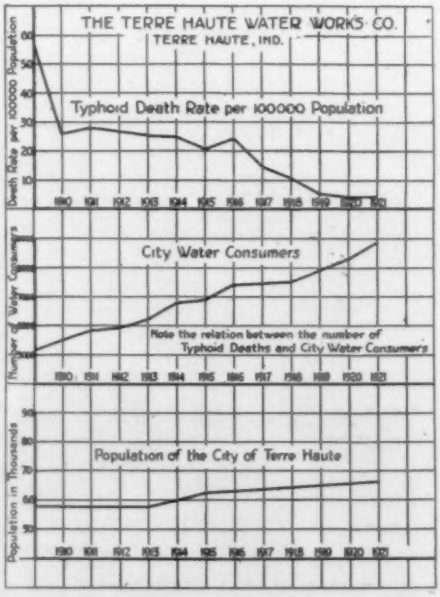
The capacity of the station is 720,000 gallons per day, and it is so designed that this may be increased to 1,200,000 without altering the building or piping. The contract prices for the entire work, including suction piping, connections and concrete head-chambers at wells, etc., totalled $51,394. The contracts were awarded at the peak of high prices in September, 1920. The general contractor was John R. Proctor, Inc., of New York and Bayonne. The filters and dry-feed machine were supplied by the New York Continental Jewell Filtration Company.

Typhoid Fever Mortality in 1920

THE Bureau of the Census has recently announced the mortality rates for typhoid fever in the registration area for 1920. It is well known that the amount of typhoid fever in a community is recognized as one of the best indexes of the community's healthfulness and in addition is a very important sanitary index. The steadily decreasing mortality rate from typhoid is therefore very gratifying. The rate has decreased, in the registration states, from 13.3 per 100,000 population in 1916 to 7 in 1920 for the same states. In 1920 Massachusetts and Wisconsin shared the honor of having the lowest rate, 2.5 per 100,000, and the highest, 22.4 per 100,000, was found in South Carolina.

Of the eleven states showing rates by color, the lowest rate for the white population was 3.6 and the lowest for the colored was 4.6, both for New York State, while the highest rate for the white population was 19.1 for Kentucky and 30.2 for the colored in the same state.

The accompanying illustration shows how chlorination can reduce typhoid fever.


THE TERRE HAUTE WATER WORKS CO.
TERRE HAUTE, IND.
Typhoid Death Rate per 100000 Population
Death Rate per 100000 Population
City Water Consumers
Number of Water Consumers
Note the relation between the number of Typhoid Deaths and City Water Consumers
Population of the City of Terre Haute
Population in Thousands

AN INTERESTING TYPHOID FEVER RECORD FROM TERRE HAUTE

Developing a City Park by Reforesting

Charlotte, Michigan, Makes a Forest Plantation

By P. L. Buttrick
Assistant Professor of Forestry, Michigan Agricultural College

THE city of Charlotte, located in south central Michigan, has in Bennett Park one of the most beautiful forest parks in any small city of the Middle West. The park was given to the city a number of years ago by the public-spirited citizen whose name it bears. It consists largely of a rather heavily wooded tract of maple, elm and oak, which except for the addition of a few roads and trails has fortunately been left in a natural condition.

Adjoining this park on two sides there was a tract of about twenty acres of rather sterile gravelly land, part of which was an abandoned gravel-pit. It sloped towards a stream flowing through the main park and was topographically a part of the park. Although this tract was the property of the city and favorably located for park purposes, it had never been incorporated in the park or improved in any way.

In the spring of 1921 the matter of improvement of this tract and its addition to the park was taken up by George Fenn, who has since been elected Mayor of Charlotte, and a number of other interested citizens. The committee requested the aid of the Forestry Department of the Michigan Agricultural College in preparing a plan for improving this tract and adding it to the park. The Department studied the situation on the ground and proposed to the city that since Bennett Park was primarily a forest park, the addition should be in keeping with it; and stated that this could best be accomplished by planting the area to young trees and by laying out roads in the addition to be continuous with those

CHARLOTTE CAN LOOK FORWARD TO A FOREST LIKE THIS IN ABOUT TWENTY-FIVE YEARS
Scene on the lands of the Michigan Agricultural College, showing trees planted in 1896

in the park. It was further proposed that the larger portion of the plantation be made of white pine, since this is a tree which grows well on gravelly, sterile soil and would succeed in the abandoned gravel-pit, where most trees would not grow at all. Furthermore, although the white pine is Michigan's best known tree and intimately connected with her history, it does not occur naturally in the region of Charlotte. When planted there it grows well. A plantation of white pine would therefore have a historic value as well as a distinctly landscape value. Bordering the woodland of the original park it was proposed to plant native maples, oaks, etc., and in certain portions of the new park to plant a small grove of nut and ornamental trees. The main plantation, however, was to be of white pine.

A series of public meetings was held and much public sentiment developed in favor of the proposition. The town council soon afterwards voted favorably upon the proposition. It was decided that the citizens should be called upon to assist in planting the trees and that the forest should be dedicated as a memorial to Charlotte's veterans of the World War.

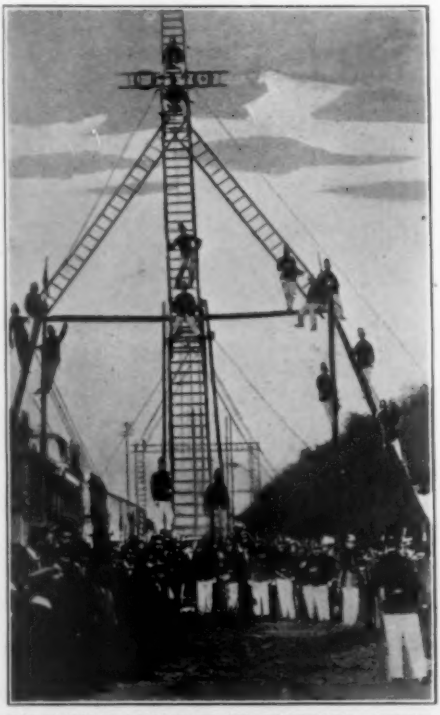
The planting stock was supplied by the Forestry Nursery of the Forestry Department of the Michigan Agricultural College, this nursery being organized to supply forest planting stock to citizens of the state practically at cost.

Nearly 7,000 4-year-old white pine were set out at a spacing of 6 by 6 feet. The trees averaged 18 inches to 2 feet high. The hardwoods occupied a smaller area and were less numerous. Some 400 of the latter were planted at irregular spacing.

A Profitable Undertaking

Since the plantation was set out by citizens who volunteered their services, the labor cost was greatly reduced. Their work was directed at the start by a representative of the Forestry Department of the Agricultural College, as few of the citizens were experienced in this class of work. The pine plantation was cultivated during the summer, but the hardwoods did not require any treatment. Despite the very serious drought of the early summer, the entire plantation came through well. It will be only three or four years before the pines will be large enough to carpet the ground and be a landscape asset to the park. In ten years they will be saplings twenty or more feet tall and will form a beautiful young wood. In twenty-five years they will be trees upwards of forty feet tall and from six to ten inches in diameter, and their value and beauty will continue to increase for the next hundred years. The illustration taken from an actual plantation indicates what may be expected in the way of growth.

There are thousands of abandoned gravel-pits, sandy stretches and unutilized corners of our parks which could to advantage be used for forest plantations. They add to the landscape value of the parks, and the ultimate value of the timber will frequently make the operation financially profitable.



FIREMEN'S PRACTICE IN SANTIAGO, CHILE, ON FETE DAY

This display of the gymnastic abilities of the firemen of Santiago, Chile, reminds one of many of the old-time volunteer firemen's exhibitions. Most Central American cities are not backward in fire protection, for they are equipping their fire departments with American motor fire apparatus

Elevated Steel Tank Solves Portland Water-Supply Problem

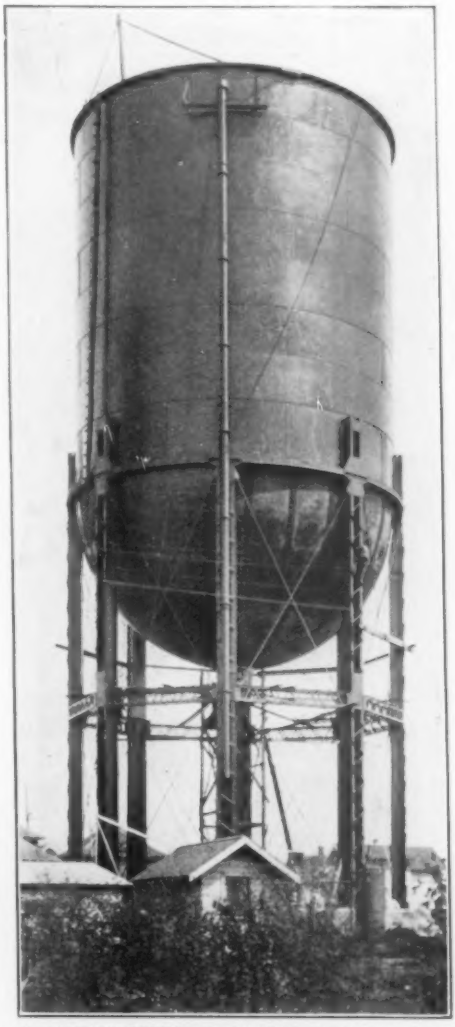
By C. J. Franklin

Hilton-Pike-Oakly Company, Portland, Ore.

THE city engineering officials of Portland, Ore., have given evidence of the city's administrative wisdom by installing an elevated steel tank to insure an adequate water-supply to outlying districts, and at the same time equalize the pressure. The city was confronted with the problem of taking care of a rate of flow reaching a peak load of 21,000,000 gallons at 8 o'clock in the evening during the summer months, through two mains which normally furnish only 12,000,000 gallons a day. After a thorough investigation F. M. Randlett, Chief Engineer of the City Water Department, and his assistant, B. S. Morrow, decided to install a hemispherical-bottom elevated steel tank of 1,000,000 gallons capacity as the most economical, efficient, and permanent solution. This decision resulted in a saving to the city of $220,000—the difference between the cost of the tank and the amount which would have been expended to secure the same results by providing additional mains.

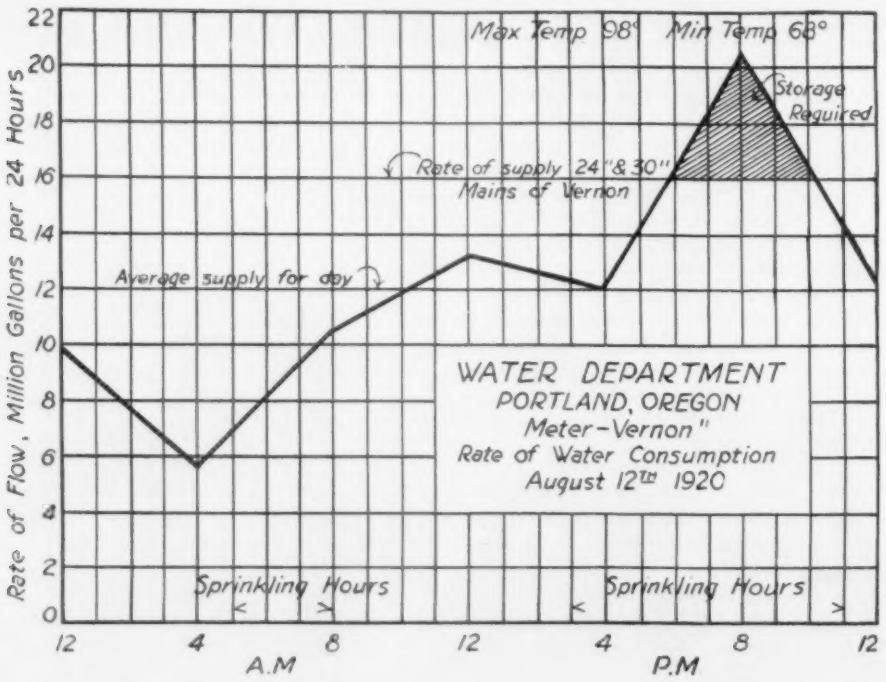
The so-called Vernon system in Portland supplies practically all that portion of the city lying north of Fremont Street and east of Nineteenth Street, and includes St. Johns, University Park, Woodlawn, Kenton, Overlook, and Vernon. Water for this residence district is supplied from reservoirs 1 and 5 by cast iron mains, respectively 24 inches and 30 inches in diameter and approximately 30,000 feet in length. During the heavy-draft period of the summer, the average daily demand for the Vernon system is only about 12,000,000 gallons, but during the sprinkling hours in the evening the demand is almost doubled, reaching a rate of flow of 21,000,000 gallons a day.

The two mains can easily deliver water at the site of the elevated steel tank at the rate of 16,000,000 gallons a day, and the additional amount of water required during the peak period could be supplied in either of two ways—by laying additional mains or



A 1,000,000-GALLON ELEVATED WATER-TANK IN PORTLAND, ORE.

This tank is 50 feet in diameter, 40 feet high, with a hemispherical bottom, 25 feet high; height of shell, 56 feet; plate thicknesses vary from 13/16- to ¼-inch



by providing adequate storage to be turned into the system during the peak demand. A 24-inch main capable of providing an additional eight million gallons for this district would cost $330,000 at the very least, and would be required to function only for a period not to exceed four hours a day during three months of the year.

On the other hand, a million-gallon elevated steel tank discharging into the distribution system during the excess peak demand would meet all requirements and give a certain amount of reserve water in the district, to be supplied for fire protection and domestic demand, and the tank and foundation would cost only about $100,000. The decision to use an elevated steel tank instead of laying an additional main to this section appears wise in view of the fact that the ultimate development of the further limits of this section will require a large main coming in by an entirely different route, which would render any additional line laid at this time of little value.

The new elevated steel tank is controlled by a two-way altitude valve which permits the tank to fill in off-peak periods and to discharge when the two district regulators are full open and the pressure in the mains has fallen to about 36 pounds. This condition will occur during the sprinkling hours of the summer months only, or in case of excessive draft, or on account of fire.

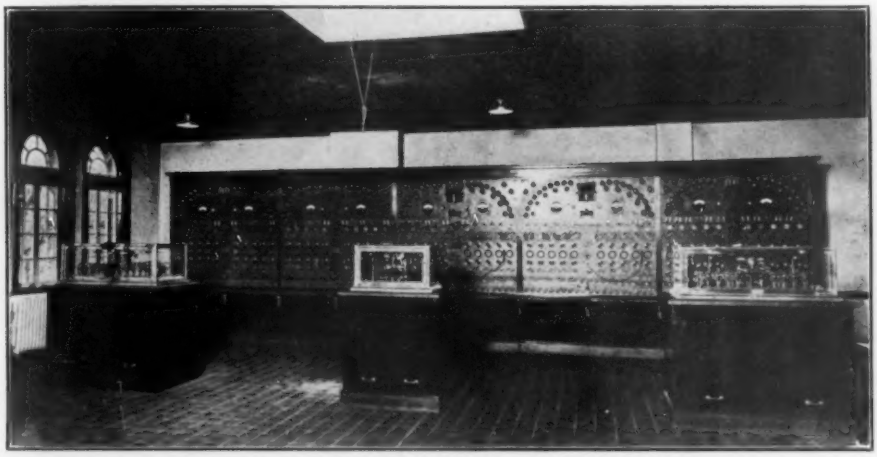
As the appearance of the tank structure was of special importance, plans for an ornamental masonry tower were drawn, and specifications were written covering a tank which could be surrounded by an independent masonry wall at some later date. After careful consideration had been given to the different materials suitable for the construction of the tank, steel was selected on account of its absolute reliability, watertightness and reasonable cost. The specifications provided that the tank should have a diameter of 50 feet, a maximum height of 110 feet, and a minimum height to bottom of 40 feet. Furthermore, all steel work should be kept within a diameter of 54 feet, which would allow a space of 2 feet between the tank shell and the masonry for the purpose of inspection and painting. The Chicago Bridge & Iron Works submitted the successful design and was awarded the contract for the steel work of the tank and tower.

A Complete Modern Fire Alarm System

New Equipment at Birmingham, Ala., Gives Full Protection

THE new fire alarm system in Birmingham, Ala., put in service in January, consists of 200 new fire alarm boxes on the streets, 25 miles of underground cable with a total wire length of 306 miles, 216 miles of overhead wire, and a complete new central office.

The central office with its recording and transmitting apparatus is located on the second floor at fire headquarters on Sixth Avenue between 19th and 20th Streets. Running out from here are the circuits which go to the various boxes and also to the twenty different stations scattered all over the city.



FIRE ALARM HEADQUARTERS, BIRMINGHAM, ALA.

The new fire alarm boxes are so arranged that the chief or any of his assistants can go to the nearest box, plug in a special telephone set which is carried in the chief's car, and talk directly to the operators at fire headquarters or, if necessary, with any of the engine houses. This permits him to order any special apparatus to the fire which may be necessary because of the peculiar nature of the fire, or to give special instructions for the disposition of certain companies.

Two operators are always on duty at fire alarm headquarters to handle signals. In a city as large as Birmingham, signals for two, three or even more fires may be received at the same time. On New Year's Day twenty-nine box alarms were received.

The three hundred or more fire alarm boxes are on thirty different circuits. The twenty engine houses are on ten circuits. All these circuits end at fire alarm headquarters. When a box is pulled, a red flashlight on one of the boards in the central office flashes out the signal, and it is also sounded on a tap bell. The signal can be handled at headquarters in three different ways—automatic, semi-automatic and manual.

The central office apparatus can be arranged so that the box number is automatically repeated over all the engine house circuits, and every engine house in the city will receive the alarm. Two big sixteen-circuit automatic repeaters have been installed for this purpose. These are so arranged that if a second box number comes in while another number is going out over the repeater, there will be no confusion. Only such companies will respond to the alarm as have been previously assigned to that box.

The central office can also be operated on a semi-automatic basis. Four rounds of each box number are received at head-

quarters. When operating semi-automatic, the first complete round stops at headquarters, and then the signal can be thrown over to the tapper repeaters and sent out to the engine houses.

When the alarms come tumbling in in rapid succession, the office is operated manually. The alarm is received and recorded on registers which punch holes in a paper tape similar to that used on stock tickers. One of the operators reads off the number and then sets it up on the manual transmitter. The number is checked, a lever is pulled, and the alarm goes out to the engine houses. The second operator attends to all telephone alarms and keeps all records of fire.

Alarms at Engine Houses

Three separate means are provided for sending signals to the engine houses. A register and sounder are mounted on the desk in the engine house, where a man is on duty and signals are received from the central office. A loud-sounding gong is connected over a separate circuit to wake the men at night. When an alarm is received which does not call out that particular company, the man on watch throws off a switch to silence the gong. Telephone facilities are provided to send out any company on the small fires and other still alarms. The waker switch is used in these cases to sound one blow on the gong to arouse the men.

Accurate automatic records of all alarms received and sent out are kept at headquarters. The box numbers are punched out on the register tape and time stamps, which record the day, hour and minute and furnish a permanent record for reference in the future. These stamps automatically take care of long months and short months, and leap year day, and once a century drop a day to keep in step with the calendar.

Back of the central office room is a special room for the storage battery cells which supply the current. Eighteen hundred of these cells, similar in principle to an automobile battery, are necessary to provide the energy to operate the system and furnish a reserve source. Current is taken off the lines of the Birmingham Railway Light and Power Company and stored for future use. Five ten-circuit storage-battery charging boards are installed for efficient economical handling.

The importance of the fire alarm system requires that every possible protection be thrown about the central office apparatus to guard against lightning or high-voltage current. At the end of the room is a 46-circuit protector board equipped with different types of fuses and with a bell to call attention when a fuse is blown out.

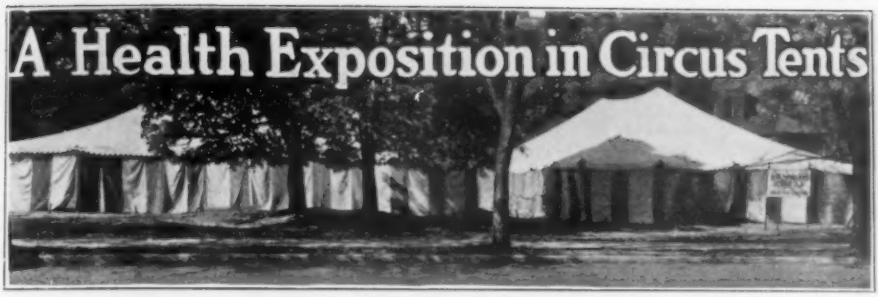
The new fire alarm boxes on the streets are of the Peerless, non-interfering successive type. Ten or a dozen fire alarm boxes are usually connected on the same circuit. Frequently two different boxes will be pulled at about the same time for the same or different fires. If these boxes interfered with each other, the alarm would be confused and time lost. If one of these boxes is operated while another box on the same circuit is sending in its signal, the second box will not interfere. At the end of each round the second box will test the line to discover if it is clear. When cleared, it will send in its signal. In this way a number of boxes on the same circuit as the central office equipment take care of receiving simultaneous alarms from different circuits.

The Fire Alarm Bureau is under the Supervision of Chief Sidney A. Middleton. Robert I. Parham is the Superintendent of Fire Alarms, and is responsible for the care and operation of the fire alarm system—the nerve center of the fire department. The entire equipment was furnished by the Gamewell Fire Alarm Telegraph Company, Newton Upper Falls, Mass.

A fire alarm bell is a gigantic cash register, and every time it rings it means that someone has issued another paid-out ticket.

Get rid of that pile of rubbish *to-day*. Every rubbish pile is a potential conflagration.

A Health Exposition in Circus Tents



By Herbert B. Larner, S. B.
Health Officer, Montclair, N. J.

THE proper education of the public in matters pertaining to health is recognized as a problem of such extreme difficulty and magnitude that it is not at all surprising that unusual methods are sometimes adopted to arouse the interest of an apathetic public. Whether health education should be under the supervision of boards of health or boards of education is a mooted question, but there is very little doubt that a solution highly satisfactory to all concerned was arrived at in Montclair when the Board of Health, the Board of Education, the local Red Cross chapter, the Y. M. C. A., and fifteen other agencies interested in health work cooperated in the successful staging of a Health Promotion Week, which was somewhat unique in its setting.

Its aim, of course, was to place before the public by means of exhibits and demonstrations information concerning the character and scope of the work done by the various organizations participating, and by means of lectures and motion pictures to consider special health problems pertinent to the occasion.

The problem of finding a suitable auditorium for lectures, having in conjunction with it a hall for exhibits, was the first to engage attention, and its unsatisfactory solution forced us to a consideration of the advisability of using circus tents. It was believed that their use would attract a far greater number of people than would be the case if an auditorium and a hall were utilized, the assumption being that the unusual spectacle of circus tents in town would have a powerful attracting influence on many people, who would attend the lectures and view the exhibits out of mere curiosity, if for no other reason.

That this belief was well founded is attested by the fact that an estimated attendance of 5,000 was recorded at the exhibit tent, and approximately 1,500 people attended the lectures, in spite of the fact that the weather was not as satisfactory as could be desired.

Reaching the Children

The large number of children who visited the exhibits was particularly gratifying and, since it is quite generally agreed that health education should begin during the early school age, emphasizes the fact that in arranging such exhibits particular care should be taken that they be of such character that their significance can be readily grasped by young children. So far as the older people were concerned, perhaps the most striking thing about the exhibits was the realization of the existence of such a large number of organizations functioning in greater or lesser degrees as unofficial health agencies. Each organization in its exhibit strove to demonstrate the scope and character of that branch of health work in which it was particularly interested, and there is little doubt that as a result of the campaign a far more intelligent and sympathetic understanding on the part of many people toward the work of the various organizations will result.

The speakers included for the most part men and women of national reputation in public health work, and, while the attendance at most of the lectures was satisfactory, at a few the results were somewhat disappointing. Particularly was this the

THE SCHOOL EXHIBIT AT THE MONTCLAIR HEALTH WEEK EXPOSITION

case with the lectures on social hygiene, but whether this was on account of lack of publicity in the proper places, or because of a saturated condition of the public mind due to so much propaganda on venereal diseases during the war period, is a question.

A large number of motion picture films were used in connection with the program, and we found that a picture would frequently attract a large audience, while a speaker of national reputation would sometimes fail to draw the number of people that he deserved. There can be no doubt of the effectiveness and attractiveness of motion pictures as a means of presenting health matters to the public, but at the present time probably 75 per cent of the health pictures in existence are of little real value as educational material and had better be discarded in the best interests of the work.

By far the most encouraging feature of the entire campaign was the great interest shown by the school children. Each afternoon, after school hours, hundreds of children crowded the tents, frequently in groups, with adults to interpret the various exhibits for them. After all, it is the children—the men and women of to-morrow—who are the logical candidates for health education, and the logical place for such instruction is in the public school. When every public school system contains a well-established department of health education directed by a competent instructor, we shall then have made a start that will really amount to something.

In commenting on Montclair's Health Week editorially, the Newark *Star-Eagle* said:

"Being on the slopes of the Orange mountains and possessing a good water-supply and an adequate sewerage system, Montclair scarcely would be considered a municipality in need of a health campaign. Nevertheless, the town has just closed a Health Promotion Week, the progress of which aroused the interest of the residents.

"The significance of the event in the suburbs lies in the word 'promotion.' The campaign was not primarily one to ward off the ravages of a particular scourge or epidemic, but rather was a general undertaking to improve the hygienic conditions already good.

"As such, the observance of this week marked a distinct advance over the usual short-sighted policy of not discussing health problems until the community is visited by a serious epidemic. Moreover, this project in Montclair was not concerned with the negative function of curing maladies, but with the positive purpose of building up the body to withstand disease germs.

"It was the social aspect of the problem which was emphasized in Montclair's Health Week, and for that reason the event was important in the annals of the town. Certain conditions must obtain to give the impetus for good health unimpeded room for development and fruition. Montclair has done well to call attention to these facts."

Law versus Education in Public Health

You cannot make a man moral nor clean by law; you cannot do away with contagious disease by law; you must secure cooperation by the individual, and this is obtained only by enlightenment and appeal to common sense.

Production, Not Reconstruction, the Order of the Day in Germany

Housing and Town Planning Notes of a Visit in October, 1921

By Stephen Child
Fellow, American Society of Landscape Architects

EDITORIAL NOTE—*In this article our readers will find some startling evidence of the manner in which Germany is building vast domestic improvements and thousands of houses, which will give her an advantage in the industrial competition with her former adversaries, who have been trying to conduct their post-war business on a more conservative financial basis.*

DURING the summer of 1921 the writer was again in Belgium in the interests of the "International Clearing-House of Civic Information."* Toward the close of his visit he was invited to join a party of Belgian municipal officials upon a "voyage de renseignement," this time into Germany, supplementing visits of other years in Holland† and England.

The first stop was at Cologne, where, across the square from the railroad station, it will be remembered, is the great "Dom." After viewing ruined Rheims, and with the devastation of France and Belgium vividly in mind, to see this cathedral unharmed and to note the marked evidences of rapidly returning productivity, if not genuine prosperity—the thoroughly up-to-date Rhine water-front with its docks and quays all busily employed, and its attractive tree-lined embankments—made one feel the startling contrast. There were many in the party who were thoroughly pleased to see the British flag flying from the roof of a great hotel, and over the entrance the words, "Headquarters British Army of the Rhine," and, as we toured the city later, to see many "Tommies" in full war regalia—a conquered city in everything but evidences of destruction.

In and about Cologne we visited twenty different housing projects, some of which were of great size, and these house-building activities were by no means the only construction going on. At Cologne, at Düsseldorf and Essen, and in many places between, there was evidence of enormous constructive effort—new or enlarged factories of every sort, new public or quasi-public buildings, new bridges, improvements in highways and street railway construction, and, most particularly, in the steam railroads. The outstanding fact noted throughout our Germany journey was that these people were all feverishly at work, not restoring, but producing. We were told on reliable authority that there were not 50,000 idle men in all Germany, and that on the pay-rolls of the Government-owned railways there were 600,000 more men than before the war, a statement not to be doubted in view of what follows.

A few miles outside of Cologne, for example, enormous new railroad facilities were building, acres and acres of new freight yards and shops. We noted the grade crossings abolished at great cost. Adjacent to all of this a new garden city, Gremberger, is springing up. Plans under way called for 3,000 new houses or lodgings, over 700 of which were either finished or well along toward completion. The architecture is heavy, not particularly German in character, and quite uninteresting. Most of the houses are in rows of from six to ten. No dwellings are over two and one-half stories, many are but one and one-half, but some of the hotel and semi-public buildings are three stories.

As to prices and rents, it is difficult, in view of the fluctuations and fictitious values of the mark, to convert these to an American basis. We learned, however, that these six- and seven-room lodgings were to rent at from 15,000 to 21,000 marks a year. With the mark then, October 16, 1921, at three-fourths of one cent, this was from $10

*See THE AMERICAN CITY, April, 1922, page 348.
†The Holland trip was described in THE AMERICAN CITY for February, 1922, page 103.

to $12 a month. But they figured a mark to be worth twice this, or more, which would be a rental of from $20 to $30 a month of our money. Furthermore, the Government in one way or another advances three-fourths of the cost at 2 per cent, details varying in different places, sometimes as here through the state railroad, elsewhere through municipal or Government loans to cooperative and building societies. Contrast with this, that in Belgium the Government advances but one-fifth to such societies, and at 5 per cent or 6 per cent.

Among these Cologne projects we saw one then nearing completion, perhaps a hundred really expensive homes, mostly single houses of large size, eight to twelve rooms, a few, however, in rows, all a very heavy, ugly type of architecture, but all with the most approved modern conveniences. All had ample front and rear yards, and in most cases faced either squares or broad parked avenues. Evidently no expense had been spared. Such dwellings in America would cost not less than $25,000 each, and Germany was building them for retired army officers!

Ten or fifteen miles southwest of Cologne is a more hilly region, in the midst of which there are, near the surface, enormous deposits of the so-called "brown coal" (lignite), a poor-grade fuel, for which there is a large demand. The material is excavated by steam shovels or by hand, removed by small trains to near-by works, and pressed into oval briquettes about the size of a large egg. About these "mines" a number of villages have grown up, the district being known as Bruhl. Here there was also great housing activity, with about 1,000 houses or lodgings in process of construction, to help stabilize the labor supply. The situations for these homes were well chosen, usually half a mile or more (but within walking distance) from the mines, some on sloping hillsides having a fine view of the city and the Rhine Valley. All of our party noted the intense industrial activity evidenced by the many hundred factory chimneys in this Cologne district, all sending forth clouds of smoke.

PORTION OF ONE OF THE MANY HOUSING PROJECTS NEAR COLOGNE

This one was built during the Great War

Leaving Cologne next morning by auto and crossing to the right bank of the Rhine, we passed first through an older, uninteresting, but intensively active, industrial center, Mulheim, with many overcrowded, old-type tenements, but with some new construction on the outskirts; then on into a rich farming district, with every evidence of thrift and productivity. Long hours of steady, hard labor seemed to be expected everywhere in mine, factory and farm.

About half-way between Cologne and Düsseldorf, in the center of a beautiful, quite rugged and well-wooded country, is the district of Bergisch-Gladbach, the Dalton and Pittsfield of Germany, the center of the fine paper-making industry. In 1895 one of the wealthy manufacturers built here on the outskirts perhaps the first real garden city,—certainly the first in Germany, and in many respects the most interesting,—called "Grönauerwald." Two Munich architects were the designers of the town and its first buildings, and it is certainly all quite idyllic. Several hundred cottage homes were built at the beginning of the

HOUSING AND TOWN PLANNING AT DUSSELDORF—PORTION OF BOULEVARD SYSTEM

Note car-tracks on outer edge of central planting strip

development, and little was done thereafter for several years. But in October there was considerable building activity at this place, mostly houses in rows of from six to ten. There, as elsewhere, the Government furnished three-fourths of the amount necessary, the remaining fourth being raised by local interests. It is upon this one-fourth only that rentals are based, a most uneconomic basis.

From pretty Grönauerwald we motored on in the afternoon again through prosperous-appearing farms and frequent small manufacturing centers, like Opladen, Denrath and Wiesdorp. These towns all seemed characteristically well ordered and neat, the various plants all extremely busy and no idle men in evidence. The workmen's homes, most of them detached cottages in fair-sized lots, were of varied architecture and, thanks to the generous interest of the mill owners, all gave many evidences of liberal expenditure and quite luxurious appointments, considering the character of the occupants.

At Denrath a fine chateau near the town's center, with beautiful grounds, gardens and lake, all in the French style, once the property of an old noble family now fallen upon evil days and unable to maintain it, had passed into public ownership; the townspeople had enough money to buy it, and it is now a public park, the mansion a community house.

Wiesdorp, just mentioned, is one of the important centers of the German aniline dye industry and is an especially prosperous-looking community, with hundreds of modern houses, mostly in rows, and apparently built during the war or since. Thus, while Germany was destroying homes in Belgium and France she was building them in her own country.

Düsseldorf is a more attractive city than Cologne, though not so large. It has a beautiful Hofgarten and fine buildings, and every evidence of prosperity. We were driven about town, saw the attractive and extremely well-appointed Rhine waterfront, much of it parked and lined with tree-shaded promenades and boulevards, the busy "Hafen" full of shipping, and on the outskirts of the town the fine boulevard system. Here we noted with pleasure many evidences of French Army occupation.

We visited six or eight quite large new housing schemes in various degrees of progress and then went on by auto toward

MARGARETENHOHE, THE MARKET-PLACE AND THE FOUNTAIN OF THE "SCHATZGRABER," THE SEEKER AFTER TREASURES

An inscription reads, "Seek them in noble deeds"

THE OAK AND THE VILLAGE FORUM AT GRONAUERWALD GARDEN CITY, NEAR COLOGNE

Essen. This is a particularly attractive country, quite hilly, and, for much of the way, beautifully wooded. Again we passed prosperous-looking farms and busy towns, all of course quite undamaged by war.

A few miles beyond the little Socialist colony of Freiheit, in the picturesque, narrow, steep-sided valley of the Ruhr, is Kettwig, where there are large and prosperous woolen mills. Here, too, the workers were building their own homes, during their slack times and hours of leisure. By this method, we were told, it takes them, as a rule, about two years to build one of their small cottages. An architect has been secured for the cottage plans and for the supervision of construction, taking as his fee one of the small houses erected by the men from his own plans. Here, too, they must employ outside trades for part of the work. There has been developed both here and at Freiheit a remarkable esprit de corps, which has succeeded in overcoming many difficulties.

The Krupp Colonies

Essen, famed as the home of the Krupps and engines of war, lies also in the valley of the Ruhr, and the town is spreading out and up the hillsides of one of the minor branches of this river in all directions. All about on these hills are the shafts, works and culm piles of great coal mines, but the city is surprisingly clean. As we entered at nightfall, coming over the hills from Werden, the many chimneys of the enormous Krupp works were belching forth smoke and flame. Next morning, although we were not permitted to enter the works, we drove in and out of many streets and ways lined with high walls and great mills, getting a good idea of the extent of the enterprise, and we became well aware that despite the war there was no lack of work here. "What are they making here now?" we asked, and the reply was: "Everything —locomotives, agricultural implements, sewing machines, typewriters, cameras and their parts."

There is a fine railroad station, and, near-by, excellent hotels. Not far away is the usual "Stadtgarten" with its great assembly hall, and near this an Art Museum. All about are many pretentious homes, built in the colossal, heavy type of architecture so much favored in Germany before the war. The great "Works" are not far away; in fact, they sprawl all over the level area of the lower town, with miles of railroad tracks entering the gates and winding about behind the walls and mills.

We were shown, first, the older tenement houses. Some of the first, built about fifty or sixty years ago, near the mills, are barrack-like stone buildings four or five stories high, blackened with smoke, each housing ten or twelve families. There is quite an open space about each structure, now shaded with trees. We then went on to the more pretentious, newer groups. Of these, Alfredshof includes, besides hundreds of row-houses, many large and imposing apartment buildings. But more attractive, and indeed more extensive, is the great

colony, "Margarethenhöhe," built some years ago by the second Krupp on the occasion of the marriage of his heir and daughter, Margaret. Here are hundreds of handsome homes for workmen, with many parks and public gardens. The civic center of the colony, called the "Markt," is paved in pattern, bordered by booths for market-day, and by shops, post office, public hall and other quasi-public buildings.

By far the most beautiful of all the Krupp colonies is Altenhof. Here is where employees who are incapacitated for further work, either by age or accident, are given a home for their declining years. The central feature of this project is a very beautiful valley park of perhaps fifty acres that adjoins or merges into the Stadt Wald of about five hundred acres. Through the smaller park flows a pretty brook, and the valley is laid out with skill and maintained with the utmost care. Here are open lawns, suitable paths, trees and shrubbery, but no garden bedding. On both sides are picturesque, winding, tree-shaded, narrow streets, bordered almost exclusively with detached houses, some of the most attractive cottage architecture the writer has ever seen anywhere. Each has an ample lot with pretty front yard and well-kept rear gardens. There are two chapels,—one a gem,—a group of little stores and the post office; all this for those having families. Then there are particularly beautiful groups of apartments, low structures two and a half stories high built about lovely sheltered gardened courts. Some of these are for single old men and others for single old women, and near-by there is a splendidly appointed hospital for the most decrepit and those more seriously ill.

We were shown, also, several other large housing projects in outlying parts of the town, then in progress or nearing completion, and were told that, notwithstanding the post-war decrease in the number of men employed at the Works, there was even then a serious housing shortage at Essen, which they were strenuously endeavoring to meet. We noted also a real shortage in school accommodations. Many of the older school yards were partly filled with temporary school buildings. As we passed one of these groups at the noon hour, the boys 12 or 14 years of age, about 50 of them, were not at play, but drilling under the careful instruction of a young man, evidently a former officer.

What Does It Mean?

Surely enough has been said of the immense volume and variety of public and quasi-public improvements and productive activities then going on in Germany to make even those who have not seen any of it realize something of its magnitude and import. One may readily understand, too, some of the feelings of the members of our party, Belgian municipal and housing officials, architects, and engineers, struggling as they are at home against empty treasuries, cramped credits, high prices, criticism of all sorts, and labor troubles. Many times came the question, "How is it possible for this nation to do all this?" Finally one of our party, the able correspondent of *Le Soir*, one of Brussels' leading newspapers, frankly asked some such question of one of the business men, who was showing us about, and here is his reply: "We are not troubling ourselves about the future. We are spending money. We are piling up debts! What do we care!" This was the apparent sentiment all through the part of Germany that we visited, accompanied by an inordinate desire to make at once, while the opportunity was good, all possible internal improvements. To another of our party, a member of the City Council of Brussels, this reply was given: "We have about 200 billion marks of debts. Why should we not add thereto a new 100 billion, especially when it is a question of dwellings? The Allies will not be able to take those away from us."

NOTE.—Some conclusions, the results of Mr. Child's observations in regard to housing and town planning during the past two years not only in Germany, but in Belgium, Holland, France and England, will appear in THE AMERICAN CITY next month.

Wanted: "Before and After" Views

If some eyesore in your city is to be turned into a beauty-spot, or some antiquated public building is to be replaced by a modern one this summer, why not secure a photograph of existing conditions before the work is started, and a view from the same point after the improvement has been completed? Such photographs will be of historical value in your own city, and an inspiration to other communities to do likewise. THE AMERICAN CITY will be glad to publish occasional contrasting views of this kind.

Do Civil Service Rules Promote Efficiency?

No

To the Editor of The American City:

My experience, covering 25 years in public life, has convinced me that no city can conduct its municipal business with the highest results and be hampered with civil service rules, any more than a private business establishment can make a success under such handicaps.

We have found in Jamestown that often the best applicant for policeman, fireman, lineman, etc., is found at the bottom of the civil service list while an inferior man is often found at the head of the list in percentage. There is no such thing as ascertaining the integrity or character of a man by any questionnaire system. This was shown the other day when Thomas Edison tried to get the best men for service in his works by submitting seventy-seven catch questions which even college graduates were unable to answer.

In the conduct of its many public utilities Jamestown has often found itself greatly handicapped in not being able to hire the best men or remove the inefficient because of the "red tape" imposed by civil service regulations. As a matter of fact, any system which makes retention in employment dependent upon the mere vested right a place holder is supposed to have in his job is not productive of that harmony, loyalty and discipline which are essential in any organization where business results are sought.

The manager of any concern, whether it is public or private, must be absolutely free to exercise his own judgment and his own knowledge of human nature in the selection of subordinates by practical, not theoretical, methods.

The result of forty years of civil service regulations in this country has failed to bring about that reform which civil service aimed to carry into effect. And it is the experience of every city manager that civil service rules are a hindrance rather than an aid in securing meritorious service.

All this talk about the spoils system and the creation of political machine rule, where the civil service rules are not in effect, is all bosh, because where there is an awakened public sentiment with absolutely fixed responsibility and adequate power vested in the governing authorities, there can be no danger of misrule unless the people themselves want that kind of rule. But, on the other hand, where the governing agency is handicapped, inadequately paid and stripped of proper authority and where there is no fixed responsibility, we get bad government and inefficiency, which is always the direct result of divided responsibility and unbusinesslike methods. It is limited authority to do things, that keeps big men out of office and leads to "cheap politics."

During the war civil service broke down completely because merit and results could not be obtained by any system of theoretical examinations.

There has never been a private business establishment conducted successfully by any system of civil service rules, and no city can run its affairs successfully by any such rules. There may be special branches of public service in the National Government where clerical knowledge may be ascertained in a measure by permitting the applicant to answer in his own way questions pertaining to his qualifications before he is accepted in the service. But when the applicant has answered correctly or explained satisfactorily his knowledge of the duties pertaining to the position for which he is an applicant, the appointing official should be free to select from any name on the eligible list, regardless of any percentage or whether the applicant is among the three highest or three lowest on the list. When we make civil service practical, it will be a success, and not until then.

And when the American people eliminate partisanship from municipal service in peace time, as they eliminated partisanship from national service in war time, they will pave the way for ideal government and real democracy.

SAMUEL A. CARLSON,
Mayor, Jamestown, N. Y.

Yes

To the Editor of The American City:

A categorical denial of Mayor Carlson's assertion that the civil service system is a failure is hardly sufficient. His experience, covering, as he says, 25 years in public life, has led him to a conclusion which is interesting in contrast to the opinions of many other public officials in New York State of equally long experience. For example, Grover Cleveland, after he had been Governor of New York, said:

"I am, if possible, more than ever convinced of the incalculable benefits conferred by the civil service law, not only in its effects upon the public service, but also, what is even more important, in its effect in elevating the tone of political life generally."

Charles E. Hughes, also, after having served as the Chief Executive of New York State, said in speaking of the civil service clause in the state constitution:

". . . There is no clause in the constitution which is of greater importance to the maintenance of high standards of administration than that clause, the full scope and meaning of which have not yet been fully determined by the courts, but are destined to be in time. . . . We have nothing more important in relation to the administration of government than a system—the best that has yet been devised—of securing men of the needed capacity by competitive examinations wherever such examinations are practicable. I believe in that, I thoroughly endorse it, and I hope to see it extended throughout the states of the Union."

The rules and regulations governing employment in successful private corporations are analogous to the civil service laws of states and cities, and while it is not fair to compare private employment to employment in the civil service, the principles underlying the two systems are the same. However, to take persons from eligible lists for civil service positions, without regard to their relative standing on the list, would be fatal to the merit system. The principal reason for the existence of our civil service laws is to counteract the constant pressure of the spoils system. To select persons from eligible lists regardless of relative fitness as shown by competitive examination is nothing more nor less than a pass examination system and is little better than the spoils system in all its glory. The pass examination for the civil service, except for labor classes, has, wherever tried, proved a miserable failure. Even the present provision of many civil service laws for the selection of one out of the first three on an eligible list often gives opportunity for political influence to control the appointment. We have had ample demonstration of this in the examinations conducted throughout the country for the selection of postmasters. Here politics seem to have controlled in the vast majority of selections, and this is what might be expected in every case where a mere pass examination is held.

I do not contend that the competitive examination system is infallible. On the contrary, I am one of the first to recognize the various points in which there is room for improvement. However, until some better means of selecting public servants is proposed, it should, and will, I believe, be retained.

A return to the spoils system is inconceivable. The spectacle we have had during the past two years of the kind of men secured under the spoils system for prohibition enforcement agents is enough to demonstrate the futility of attempting to select public employees by any other method yet devised than by up-to-date competitive examination.

H. W. MARSH,
Secretary, National Civil Service Reform League.

The Editors of The American City will welcome expressions of opinion on the following questions:

1. Do civil service rules promote efficiency?
2. Within what city population limits are civil service rules most effective?
3. To what extent do civil service rules help or hamper a city manager?
4. How can civil service commissions help city administrations?

A New Form of Expansion Joint for Reinforced Concrete Pipes

By Walter C. Parmley
Cousulting Engineer, New York City

THE expanding use of reinforced concrete pipes for conduits, sewers and pipe lines generally where a minimum amount of leakage is demanded makes the question of an economical and effective pipe joint one of increasing importance. It has been abundantly demonstrated that reinforced concrete pipes can be built to withstand pressures up to 100 feet of static head, and examples of still greater pressures can be cited.

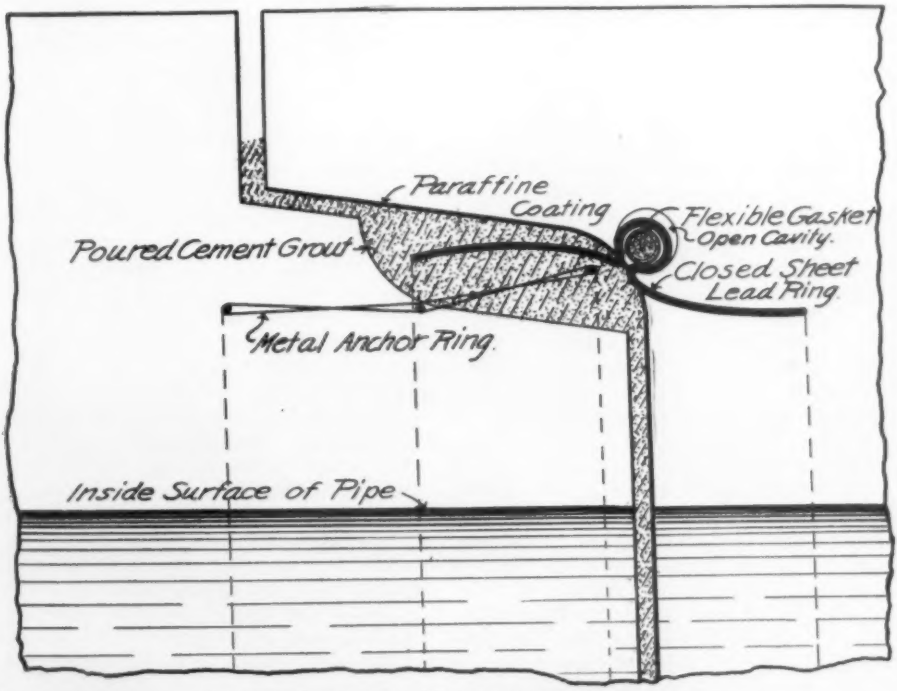
The problem of leakage consists essentially of two parts: first, the conditions necessary to reduce leakage in the barrel of the pipe to a minimum; and second, to discover a form of joint between the different pipe sections which will remain practically water-tight under all conditions in actual service. Assuming that we have pipe sections of sufficient strength and imperviousness, the following are some of the essentials for a water-tight joint:

First—The joint must be simple and practical in design, so that it can be made water-tight with reasonable certainty by ordinary laborers available for the work. That is to say, the different parts must have such relationship to each other that the mortar, grout or material used to seal the joint can be easily and effectively placed, and all the inner cavities completely filled with dense, impervious material.

Second—The material of the joint must be practically imperishable and unchanging in physical constitution, and unaffected by contact with water.

Third—A water-tight contact surface or bridge must be effected between the mass of the joint material and the ends of the pipe sections, so that water cannot pass along this junction.

Fourth—The joint must have some form of



A CONCRETE PIPE JOINT WITH NEW FEATURES

provision to permit expansion and contraction of the different pipe sections without danger of breaking the water-tight contacts at the joints. The variations between the maximum and minimum temperatures to which a pipe line may be subjected may easily exceed 100 degrees F., that is to say, the change in length due to changes in temperature of a pipe line one mile long may easily amount to 3½ feet. Obviously, this change must be taken up in numerous joints and not accumulated in a few places only. Where a pipe line is embedded in the earth, unless these expansion and contraction joints are numerous the body of the pipe will be broken, so great becomes the resistance of the earth against an end-slipping tendency of the pipes.

Fifth—The joint must permit a certain amount of shear effect or inequality of settlement of the successive pipe sections without breaking the water-tight character of the joint. The serious effects of such weakness in contraction joints have been observed by the writer where otherwise the joints were presumably effective.

The illustration shows a section of a new form of flexible contraction joint which is designed to fulfill the conditions above enumerated. The pipe sections are essentially of the bell-and-spigot type, but the form of the spigot is modified so as to permit the spigot to close up against the bottom of the bell along the inside of the pipe. The outside surface of the spigot at its base and the inside surface of the bell near its outer end are made to fit closely, and there is thus left an inner blind groove for subsequent filling with grout material, usually poured through a grout hole left in the bell of the pipe at the top, after the inside of the joint has been pointed up with mortar. This form of spigot-and-bell pipe has been used on pressure pipes for some years, but if no further feature is added, a contraction or settlement of the pipe line may cause the joint to spring a leak. To prevent this difficulty, it is now proposed to insert in the bell end of the pipe section a ring of lead, or copper sheet metal—preferably lead—formed into a complete ring with soldered ends and molded into the bell end of the pipe. The peculiarity of this ring is that it is shaped so that there is a fold in the metal extending around the entire circumference of the ring. This roll or fold is brought down close at the throat, and one edge of the sheet metal ring is shaped so as to conform to, and lie flat against, the upper surface of the cast iron base ring that forms the bell end of the pipe.

The concrete can now be poured and the pipe section completed so as to embed the upper edge of the metal ring, and the concrete will not enter the folded portion of the ring. After the pipe has hardened, the edge of the ring which lies flat against the inner surface of the bell is pulled out into the position shown in the figure. This edge later becomes embedded in the mortar of the joint, as shown.

In the process of pulling the metal into the position shown, the rounded part which lies back in the body of the pipe is detached and pulled loose from contact and thus becomes free thereafter to come and go within a self-made circular pocket extending annularly around the entire body of the pipe. This is shown in the illustration.

If the inside of the bell is painted with paraffine or asphalt, there will be little or no adhesion between the grout of the joint and the concrete of the bell end of the pipe, and the lead ring becomes permanently anchored in the joint material along one edge and in the solid body of the pipe along the opposite side of the contact surface between the two. The lead sheet is thus free to come and go easily with contraction and expansion movements without breaking the continuous metal bridge across the joint.

To prevent the possibility of cleavage along the contact surface between the spigot and the grout filling of the joint, a hoop of metal mesh may be molded in the spigot end of the pipe, projecting into the joint space and anchored in the grout, as indicated.

To further facilitate the molding of the pipe and prevent any possibility of getting grout into the fold in the metal ring when the pipe is poured, a gasket ring can be formed into this fold when it is rolled. This gasket or rope of elastic material serves as a cushion against which the metal can work. With the rolled rounded shape of the metal, as shown, molded in the body of the pipe at the bell end, it is obvious that the two sections of pipe can be separated a considerable distance without endangering the continuity of the metal waterstop that bridges the gap. By the avoidance of any sharp crimps or folds of the metal, all danger of the metal's cracking along the line of the bend is prevented, and the metal can work back and forth an indefinite number of times without danger of cracking.

It is specially to be noted, particularly if sheet lead is used, that shearing effect or side-slipping of the sections can be permitted without danger of cracking the metal and so breaking the water-tightness of the joint. By making a joint of such design that it will accommodate a certain amount of transverse displacement, it is believed that additional safety is added to any joint that provides only for expansion and contraction movements.

The form of joint shown is not limited to concrete pipes, but can be used to join old and new work in walls, floors, etc. Full-size sections of such joints have been made and may actually be separated by amounts as great as a half-inch without endangering the effectiveness of the metal water-stop.

County Engineers' Salaries and County Road Expenditures

An Idaho County Shows Striking Inconsistencies

IN its country-wide investigation of the salaries of municipal and county officials, THE AMERICAN CITY has come across some instances of salaries which seem disproportionately low for the character and quality of the work performed. Unfortunately, these low salaries are of quite frequent occurrence.

In examining the annual report of a county in Idaho, it is found that the maximum salary of the County Surveyor, who does all of the engineering work for the county, is $800 per year. It requires an act of Legislature to raise this salary; consequently it has not been changed in the last ten years.

The 1919 Annual Report of this county shows the sum of $74,285.35 expended on county roads for that year. The total for county bridges was $61,658.69, making a total of $135,944.04 for the road and bridge fund. The total expense of the Surveyor's office during the same year was: salary, $799.92; stationery and supplies, $53.16; clerical assistance, $750; miscellaneous expenses, $148.82; making a grand total of $1,751.90. Attention is called particularly to the salary as compared with the sum spent for clerical assistance.

In the Annual Report of 1920 for the same county, the money expended on county roads was $103,788.36; on county bridges, $23,207.82; making a total of $126,996.18 for roads and bridges. The County Surveyor's expenses for the office for the same year were: salary, $889.92; stationery and supplies, $30.34; clerical assistance, $900; furniture, $.96; miscellaneous expenses, $153.48, making a total of $1,974.70. It is interesting to note that in this year the sum for clerical assistance was actually a few cents more than the salary of the County Surveyor, who is the engineer and executive.

A careful examination of these figures shows that there is a rather sad discrepancy in the proportion of salary to expenses in the Surveyor's office, and since the Surveyor does all of the engineering work for the county, his salary is exceedingly small in proportion to the money expended. The total area of this county is about one million acres, one-half of which is national forest. Of the land outside of the forest, 50,000 acres are classified as grazing land, and 250,000 acres are classified as suitable for agricultural purposes. The county lies in the heart of the mountain district, so that all the surveying and the engineering work pertaining to the location of roads and their construction are quite expensive.

If the county were located in a prairie country where surveying was simply a matter of running lines, the salary of $800 a year might be adequate, but if the work takes the engineering party into mountainous districts and timber where locations are difficult, added salary is justified.

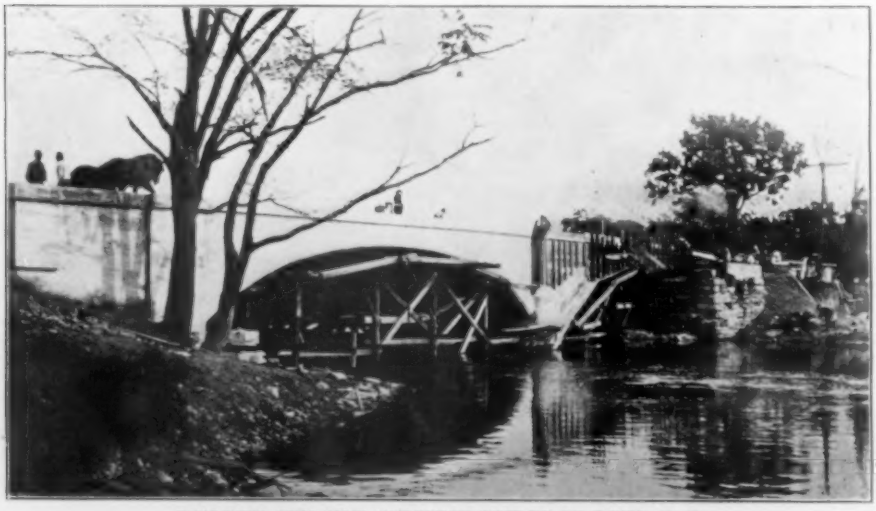
Due consideration should be given to the climate and topography of a county when adjusting salaries for county surveyors and engineers. The arduous labor and technical matters connected with the surveying and laying out of roads in mountainous districts call for a compensation greater than for an engineer who simply has to run a comparatively easy line on level, rolling prairie land.

A "Safety First" Bridge

County Assumes 85 Per Cent of Cost of Building New Concrete Arch Bridge

By C. M. Niles

THE use of speedy pleasure cars and heavy motor trucks on improved roads necessitates careful attention to the safety of highway bridges and approaches. A fine improvement of this kind has recently been completed near Rome, N. Y., where the main east-and-west highway crosses Nine Mile Creek.



BUILDING THE NEW CONCRETE BRIDGE AT ROME, N. Y.
Position of old abutment shows how the alignment was changed to eliminate dangerous curves

At this point the stream was formerly spanned by an obsolete iron bridge with plank flooring. There was a sharp, dangerous curve at each end of the bridge, which was known to motorists as a death-trap. Fully a score of automobile accidents occurred here, several of them resulting fatally. Strangely enough, after carrying innumerable heavy loads, the old trusses suddenly buckled while a light machine was crossing the bridge, and the whole structure collapsed into the creek.

The local highway authorities have erected a modern two-span concrete arch bridge to replace the fallen structure. The alignment of the bridge was changed so as to eliminate the dangerous curve at each end. The highway was straightened and widened, as was also the bed of the creek above the bridge. It was necessary to build a long concrete retaining wall to protect the relocated highway from the wash of the stream.

The bridge was built by contract in quick time. Each arch has a span of 60 feet and rises 12 feet above normal water-level. The concrete is reinforced throughout with steel bars of various sizes. The main arches are over a foot thick. Each arch was moulded in two equal longitudinal sections, the concrete being poured continuously from start to finish of a section. The whole structure is crowned with a panel parapet railing of concrete.

The cost of the improvement was approximately $25,000. This would ordinarily be a town charge, but the town of Marcy has a small assessed valuation and was unable to bear the entire burden. So, to insure the work's being done in the best possible manner, the county of Oneida assumed 85 per cent of the expense.

Forward Steps in Municipal Affairs

Mayors

Municipal Shops Reduce H. C. L.

TIFFIN, OHIO.—By an active campaign the administration of this city has been able materially to reduce retail food prices, to the great benefit of consumers.

The first step was to learn the facts. These were obtained, in part, from the Bureau of Markets and Crop Estimates of the United States Department of Agriculture. It was learned that whereas the peak price of live steers, good to choice, dropped from 17.5 cents in 1919 to 8.88 cents in October, 1921, and that the price of these same steers (live) dropped from 23.3 per cent in 1919 to 16.44 per cent in October, 1921, the rise in per cent of the price of wholesale beef over that of live steers was from 133.1 per cent in 1919 to 185.1 per cent in October, 1921. Meanwhile the per cent of price of sirloin steak over that of live steers rose from 238.3 per cent in 1919 to 421.2 per cent in October, 1921, and the per cent of price of chuck roast over the price of live steers rose in the same period from 154.3 per cent to 224.1 per cent. Such figures seemed to justify a thoroughgoing probe of retail meat prices. This developed the apparent existence of price-fixing agreements among local butchers, and also the fact that cows were being sold at steer beef prices and that in some instances meat from diseased cattle had been sold. At the conclusion of the probe, but without the necessity of prosecution, retail meat prices in the city of Tiffin dropped from 20 to 60 per cent.

The question of bread prices was next taken up. The enormous decline in flour prices seemed to justify a demand for cheaper bread. The bakers, however, refused to sell a 16-ounce loaf for 7 cents or a 24-ounce loaf for 10 cents. The administration accordingly entered into an agreement with an out-of-town concern for a supply of bread costing 5 cents for a 16-ounce loaf, which was sold at the fire sta-

THE CITIZENS OF TIFFIN, OHIO, BACK UP THEIR MAYOR'S CAMPAIGN FOR LOWER-PRICED BREAD

tions. The first day, 500 loaves were sold in 45 minutes, with the demand unsatisfied. Owing to pressure on the supplying company, this source was shut off after the first day. Thereupon a new source was discovered, which enabled the municipality to supply bread, delivered at homes, for 10 cents the 24-ounce loaf. In less than three weeks, a local bakery accepted the terms originally proposed, and this has brought the other bakers to time.

Milk had been selling at 12 cents the quart, 2 cents higher than in some neighboring towns. But the effectiveness of the bread and meat campaigns persuaded the dairies to drop their prices.

It will be noted that in these campaigns there have been no prosecutions of any sort. The weapon upon which the greatest reliance has been placed has been publicity.

ADOLPH UNGER,
Mayor.

Health Departments

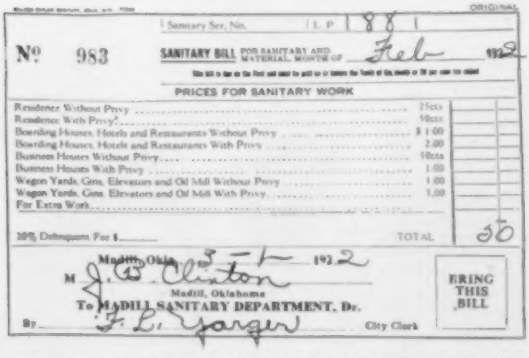
Every Week Is Clean-up Week in This City

MADILL, OKLA.—This city has an ordinance under which it has been very successful in keeping cleaned up fifty-two weeks in the year. The City Clerk is charged with the duty of keeping the plan effective.

The city employs a man at $150 per month for himself, team and wagon. This man makes daily rounds, visiting every residence, business house, hotel, wagon-yard, elevator and mill to collect rubbish and trash and haul it to the dumping-ground. Twice a month he visits the outdoor closets and hauls their contents away.

The cost of maintaining this service is met by a series of fees, which are explained in detail on the accompanying bill. The 20 per cent penalty insures prompt payment. Responsibility for collections rests with the City Clerk, who adds this to his other duties.

F. L. YARGER,
City Clerk.



No. 983 SANITARY BILL FOR SANITARY AND MATERIAL MONTH OF Feb 1912

Sanitary Ser. No. L. P. 88

PRICES FOR SANITARY WORK

Residence Without Privy	25cts
Residence With Privy	50cts
Boarding Houses, Hotels and Restaurants Without Privy	$1.00
Boarding Houses, Hotels and Restaurants With Privy	2.00
Business Houses Without Privy	50cts
Business Houses With Privy	1.00
Wagon Yards, Gins, Elevators and Oil Mill Without Privy	1.00
Wagon Yards, Gins, Elevators and Oil Mill With Privy	3.00
For Extra Work	
20% Delinquent Fee $	
TOTAL	.50

Madill, Okla. 3-1- 1912

M J. B. Clinton
Madill, Oklahoma

To MADILL SANITARY DEPARTMENT, Dr.

By F. L. Yarger City Clerk

BRING THIS BILL

EVERYBODY GETS HIS SANITARY WORK DONE AND PAYS FOR IT IN MADILL, OKLA.

Recreation Departments

Pick-and-Shovel Golf

SACRAMENTO, CALIF.—This city recently had a Pick and Shovel Day at the municipal golf links, on the "Tom Sawyer" plan. No one has asked who originated, and no one desires credit for, the bright idea of getting together lawyers, bank clerks, automobile salesmen, life insurance agents, and others to put in a day's hard labor in remodelling the municipal golf links.

The plan worked admirably. A meeting was called at the City Hall. At this meeting it was determined that the work be done by volunteers; that F. N. Evans, Superintendent of Parks, together with the Greens' Committee, figure out the changes to be made on the links; that W. G. McMillan, the State Purchasing Agent, secure from the State Highway Commission 60 shovels, 10 wheelbarrows, 10 mattocks, 10 picks, and 10 tampers; and that C. S. Armstrong, of the Western Pacific Railroad, get some water buckets and tin cups.

The hour set to begin the work was 8:30 A. M. and most of the "boys" were on the job. There were one or two "flat tire" excuses, but for the most part the golfers were on time.

The work had been planned and laid out at the links the day previous, and squad captains had been assigned to certain pieces of work known as Job No. 1, Job No. 2, Job No. 3, etc.

If any one thinks that a "bunch" of golfers cannot put a

job over, he is mistaken. When the dinner bell rang, about two-thirds of the work outlined had been finished. At the club house each golfer relished his platter o' beans, coffee, bread, butter, and cake, and after a short smoke took after the shovel again. By 3:30 P. M. the work was completed, and many golfers played over the course the same day.

Fifty-two men and two women volunteered for service. Mrs. L. F. Sherwood wielded a long-handled, round-pointed shovel along with the men, while Mrs. F. H. Webster acted as registrar, time-keeper and water-boy.

It was estimated that $250 was saved to the city. The golf course was changed to suit the golfers. The workers are still talking about what a good time they had, and that each has himself to blame if he gets caught in a deep trap, or stopped by a high bunker, for he himself was particeps criminis to the job.

GEORGE SIM,
Superintendent of Recreation.

Something New in Polling Booths

NEWARK, OHIO.—This city has found a new use for polling booths between elections. They make fine bath-houses.

The most available swimming hole for the people of Newark is about a mile from the town, near the pumping station. Just below the dam, however, there is a first rate swimming place, but there were no suitable bath-house accommodations anywhere in the neighborhood. An attempt was made to raise funds for the erection of a bath-house, but it proved unsuccessful. Then the idea was hit upon of rolling two portable election booths to the site, building a little platform between, and a stairway leading down to the water's edge. The booths are made of metal, measuring about 10 by 18 feet, and mounted on wheels, so that it is a simple matter to transport them to and from their summer location. One of the buildings is used for men and boys, the other for women and girls. The former has no partitions, but in the latter the frames and canvas which divide the booths for voting purposes were retained as partitions. These booths were made by the Kelsey Paving and Construction Company of this city.

There is a fee of ten cents for the use of the bath-house, and every patron is provided with a split basket in which to place his clothes in charge of the caretaker. A man is always in charge of the place, and the fact that he saved a boy's life soon after the booths were set up convinced people that since this scheme involves supervision, it is well worth while.

W. I. LEWIS,
Manager, Newark Chamber of Commerce.

A NEW USE FOUND FOR POLLING BOOTHS, NEWARK, OHIO

Park Departments

Harrisburg's Municipal Bathing-Beach

HARRISBURG, PA.—Situated along the banks of the Susquehanna River, five miles below the gap where it breaks through the mountains and spreads out into a beautiful valley, Harrisburg, Pa., has unusual water facilities.

The water-front has been kept free from any kind of buildings, giving an unobstructed view of the river, dotted here and there with low-lying islands; for the strip of ground between Front Street and the extreme edge of the bank, extending the entire length of the town, is a city park, where all can enjoy the beauty of the scenery and the coolness of the breeze from the water. Opposite the city is an island that for years has been used for park purposes. Here are baseball diamonds, running track and tennis courts, and for some time past a bathing

HARRISBURG'S MUNICIPAL BATHING-BEACH

place has been maintained on the extreme lower point. A small wooden building, containing lockers, provided accommodations for the bathers. At the upper end of the city, along the river shore, another such bath-house was located, but both of these were inadequate and primitive.

At the election in November, 1918, in response to the growing demand, the floating of a loan for $40,000 was voted on, for the erection of a concrete bath-house and the establishment of a municipal bathing-beach. On June 20, 1921, the building was completed and thrown open to the public.

This attractive-looking concrete bath-house is equipped with dressing-rooms, lockers, shower-baths, drinking-fountain, telephone and electric light. One side is set aside for men, and the other for women. Outside, at either end of the building, are stationary wringers for the bathers to use in wringing out their suits, after dressing. A board walk from the common central door forms the runway to the water.

There is no charge for swimming privileges, and swimming suits are supplied for the bathers at a nominal fee, except to small children, who may use them without charge. A concession has been given for a refreshment stand.

The surprise has come in the number of people who frequent the beach. Thousands come daily, and the bath-house from the first was taxed to its capacity. Soon it became necessary to erect auxiliary tents to take care of the overflow. These in turn have been filled.

Many problems have arisen in the administration. The first serious one was the discovery that different people were complaining of lacerated feet. While the bed of the river is rocky, it was soon found that the cause came from pieces of glass. Careless people buying bottles of "pop" had broken the bottles and thrown the pieces into the water. A restriction at the refreshment stand, that no bottles could be removed from the stand, eliminated a great percentage of the accidents. Playing ball on the beach or in the water, while an enjoyable sport, was also prohibited, as many people were accidentally hit by the balls, and in some cases painful injuries were sustained. All this led to the establishment of a "first aid" tent where a trained nurse presides and gives treatment to all who apply.

In addition, life-guards watch over the safety of the bathers, and a pulmotor has been installed in the first-aid tent for the resuscitation of people rescued from drowning. Every care has been taken to safeguard the lives of the bathers.

As time passes and experience shows the need, additional improvements will be made, but even now the municipal beach is a most popular venture.

EDWARD Z. GROSS,
Superintendent of Parks and Public Property.

Libraries

St. Louis Public Library's Municipal Exhibit

St. Louis, Mo.—A comprehensive exhibition of the methods and results of modern municipal work has been conceived and carried out in St. Louis by Lucius H. Cannon, Librarian of the Municipal Library. This has been done with the active aid and advice of Mayor Henry W. Kiel, who requested, through President Edmund R. Kinsey of the Board of Public Service, that all city departments should participate. The

exhibit was organized chiefly under the city departments of public welfare, public utilities, streets and sewers, public safety, and the President of the Board of Public Service, the last named having in charge the city's construction work.

On entering the delivery hall, the visitor saw directly in front of him a large model of the northeast corner of Forest Park, showing the recommendations of the Division of Bridges and Buildings of the Department of the President for lowering the grade of the two railroads that pass through this portion of the park, and incidentally abolishing important grade crossings on Lindell and Union Boulevards. This model, which was made originally as an exhibit for a public hearing before the State Public Service Commission, attracted much attention. This department also showed photographs illustrating the construction of streets, sewers, bridges and buildings. An important feature was interesting material concerning the municipal bridge, one of the most noteworthy constructions of the kind in the United States.

Under the Department of Public Welfare were the exhibits of the Health Division, the City Hospital, the Division of Parks and Recreation, the City Sanitarium, and the Municipal Nurses. Photographs properly labelled and displayed on screens were freely used.

The work of the City Hospital in occupational therapy was interestingly shown and included several glass cases filled with objects made by patients. In connection with the work of the Municipal Nurses there was a display of infants' garments.

The exhibit of the Department of Public Utilities comprised those of the Water Division and the Lighting Division. The former was very comprehensive and included an entire model filter plant on a scale of 1/150, with wash water tank and water meters arranged to show clearly the operation of the machinery. The actual chemicals used in the purification of the Mississippi River water were shown in bottles, and the various stages of purification were exhibited in large glass jars. The Division also showed an interesting set of wall maps and the machine for tapping water-mains while still under pressure, obviating the necessity of shutting off the water. The Lighting Division showed both full-size and reduced

WATER DIVISION SECTION OF THE ST. LOUIS PUBLIC LIBRARY'S MUNICIPAL EXHIBIT

models of the new electric light standards recently installed by the city in the public parks and on the boulevards.

The Department of Public Safety exhibited photographs and schedules illustrating the work of its various divisions, including that of fire and fire prevention, which attracted perhaps more attention than any other item in the exhibit. It showed a full-size fire-alarm box and the exact mechanism used in receiving and recording fire signals at the engine houses. Demonstrators on duty during a large part of the day showed the workings of this and other machinery in the various exhibits to interested visitors. The work of the City Plan Commission, both already carried out and planned for the future, was shown by photographs on screens.

The delivery hall was decorated during the exhibit with potted plants furnished from the greenhouses of the Division of Parks and Recreation and constituted a striking addition to the exhibit of this department.

The exhibition has already shown practical results. Although planned at first for the month of October only, it was extended to the close of the year—a period just three times as long as that contemplated, as it was evident that public interest required the extension.

Interest in this exhibition has not been confined to St. Louis. Several requests for information regarding methods of organization and display have been received from other cities, and the prospects are that other municipal exhibits of this type will be given in the future and will render greatly needed service in the cause of popular education.

WILLIAM E. ROLFE.
Associate to the President, Board of Public Service.

Our Community Chest

1. Has substituted cooperation for competition in doing the social work which must be done each year in this city.
2. Has afforded a common platform upon which everyone may stand, regardless of race, color, creed or nationality.
3. Has demonstrated itself to be the logical "next step" in the organization of our resources, both in men and money, for social service.
4. Has vastly increased the number of those interested in social work in and for Cincinnati.
5. Has increased the interest of the individual giver in the work to the doing of which he has contributed his money.
6. Has made evident to everyone the fact that social work is an obligation of citizenship.
7. Has convinced the giving public that constructive work is possible.
8. Has shown that the insuring of human welfare is one big problem rather than a series of unrelated small ones to be solved as separate things by unconcerted and uncoordinated action.
9. Has saved the giver the annoyance of continual solicitation by an endless number of individual collectors representing different agencies and organizations.
10. Has lessened the cost of collecting the funds which are absolutely necessary for carrying on the work being done by the 75 agencies which, coordinated, compose the Community Chest.
11. Has supplied a workable instrument for the examination of the needs of both the city and the different organizations.
12. Has given wise suggestion and helpful assistance to the different agencies.
13. Has coordinated public and private agencies.
14. Has been the greatest single factor in the development of social education in Cincinnati.
15. Has secured the enthusiastic support of practically every great philanthropic and civic organization in this community.
16. Has given to Cincinnati a place of acknowledged leadership among American cities in the wise handling of its social problems.
17. Has made possible an increase in preventive work rather than a mere enlargement of ameliorative effort which must necessarily be repeated year after pear.
18. Has resulted in a general bettering of methods of work.
19. Has provided an accessible, reliable and comprehensive record of the handling of specific cases by different agencies, thus making wasteful and harmful duplication of effort unnecessary.
20. Has made possible wise planning for the future.
21. Has given an opportunity for a more economical administration of individual agencies through the establishment of a Central Purchasing Bureau.
22. Has given a background of permanency to social work here which insures its future stability.
24. Has developed a sense of social obligations in the entire community.
25. Has been one of the great unifying forces in the life of the city.

—From the *Bulletin* of the Woman's City Club, Cincinnati, Ohio.

Curing Concrete Roads with Calcium Chloride

Interesting Results of Field Tests in Illinois

FIELD tests which were conducted during the last year by the Illinois State Division of Highways have developed amazing results in the rapid curing of newly laid concrete highways through the use of calcium chloride. The field tests were preceded by extensive laboratory investigations, in which practically every conceivable method was tried out. Between 450 and 500 specimens of concrete were made and tested. Throughout all the tests, those specimens in which calcium chloride was used showed the best results. The chemical was applied in a number of different ways, but the best results were obtained when the specimens were sprinkled with granulated calcium chloride at the rate of about 3 pounds per square yard of surface. This method of curing gave higher strength in 14 days than the usual wet earth or ponding method does at the end of 28 days.

The investigators felt that the strength of the calcium chloride might be nullified by heavy rains, which would wash this readily soluble chemical from the pavement and thus reduce its curing properties. Tests were made in which the granular chemical was washed off the specimen at the end of 12 hours. It was effectively shown that the curing process in which calcium chloride was used is practically complete within the first 24 hours, after which it does not aid appreciably. The chemical is usually applied to the pavement from 8 to 16 hours after the concrete is finished. Thus it is not difficult to protect it from rainfall if the weather looks threatening or to apply a second lot if the first is washed off.

Tests of this method on roads under construction were made during the last construction season. On one job of seven miles of pavement the concrete was cured by covering the paving with about one inch of earth and then sprinkling it with a strong solution of calcium chloride. The solution was applied so that the chemical was equal to about four pounds of dry chemical per square yard of surface. The earth covering held the solution on the road and prevented the complete loss of the chemical in case of rain. The solution to be used for curing was placed in water barrels along the road the day before the sections were completed, and when applied was sprinkled from an ordinary watering-can. Frequent inspection showed that the earth remained moist, proving conclusively that the pavement was cured satisfactorily.

The granular calcium chloride method of curing concrete has a number of decided

A PORTION OF ROUTE 5, ILLINOIS STATE HIGHWAY, BUILT BY McCALL CONSTRUCTION COMPANY, USING CALCIUM CHLORIDE FOR CURING

advantages over the use of wet earth, or ponding, which has been used for a number of years. This method is economical, as it costs less than 6 cents per square yard of surface cured. There is considerable saving in labor, because no pipe line is needed. Another distinct advantage is the fact that the calcium chloride can be applied sooner after the completion of the road than the wet earth or the ponding method, thus making it possible to open roads to traffic at an earlier date without danger to the concrete.

Solutions of calcium chloride have also been used in the water in the mixers during cold weather, making it possible to work the concrete readily and prevent freezing. This method, while it does not protect the concrete from exceedingly cold weather, will materially lengthen the construction season in the fall, reacting to the benefit of highway department and contractors.

Safety During Road Construction

Methods of Handling Traffic and Arranging Detours

By A. R. Hirst
State Highway Engineer, Madison, Wis.

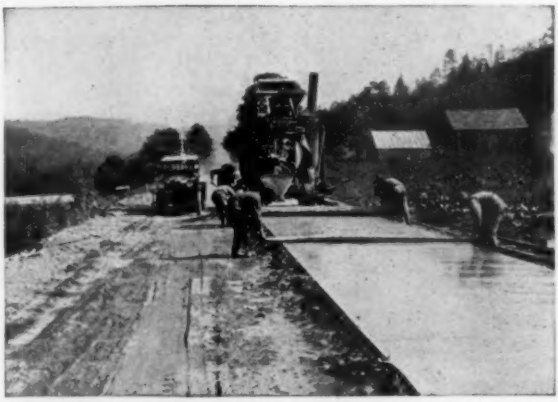
MANY accidents are caused by failure to take proper precautions during the construction of roadways. If the road is to be kept open to travel during construction, the safety and convenience of the traveling public should be the paramount consideration. In too many instances it is almost totally disregarded.

Roads under construction should be either wholly closed to general traffic or kept open under conditions which guarantee safe and easy passage. If they are kept open, the grading should be kept closely in hand. In ordinary road work there is no great reason why there should be more than one mile between the completed grading and the first plowing ahead. In most cases, contractors would be much ahead if, instead of spreading their work over the whole length of the contract and finishing nothing until the last operation, they would keep the grading operation well in hand and finish as they go. They can start a slope-trimming and finishing crew as soon as the roughing cut has proceeded not more than a mile.

On many highway jobs the grade lifts are too heavy. Drops of three or four feet at the end of a fill are not uncommon. This is contrary to most specifications, makes a poor road, poorly compacted, and also greatly inconveniences the travel in going both up and down the breast. Even where the cut or fill is not completed, the road can be kept reasonably smooth by operating a grader constantly over it as the material is being cut and filled.

MAINTENANCE ON THIS IMPORTANT INTERSTATE HIGHWAY DETOUR WOULD SAVE TOURISTS TIME, MONEY AND TEMPER

The most striking difficulties encountered in keeping the roads open during construction are caused by making short detours around culverts and bridges wherever the alignment permits. It is much better to build the



IN CONNECTICUT, ROADS ARE BUILT HALF AT A TIME, AND TRAFFIC IS THEN SAVED A LONGER TRIP OVER AN ALTERNATE ROUTE

bridge on a new site, even at the cost of a few hundred dollars additional, and permit the traffic to use the old bridge rather than a temporary structure. In quite a number of cases curves occur near bridges and it is possible by a new alignment at that point to build a new bridge and maintain the old one during construction.

In the case of culverts, instead of detouring the traffic across ditches and through fields, which usually are impassable after each rain, the engineer should build the culverts in two sections. While it is slightly more expensive to do this, the additional cost is made up many times in savings to the traffic. Experiments have been made in Wisconsin with this method during the last season. Plans and specifications for 1922 call for the construction of culverts in two sections wherever the road is to be kept open for traffic.

In some of the Eastern States roads have been built in halves and the traffic dispatched in a single direction by a system of telephoning. In traveling over sections of highways so handled this year, I was impressed that for main line traffic this method was unsatisfactory. Unless there were positively no, detours available, the money expended in dispatching and in the additional construction under such conditions could have been spent in fitting temporary detours for traffic, with more satisfactory results. On Sundays and legal holidays the traffic conditions on such sections must, indeed, have been serious.

Attention to Detours

If highways under construction are to be absolutely closed, careful attention should be given to the detour. If possible, the road over which the detour is to be carried should be given the proper amount of attention the preceding year. Nothing is more exasperating to the motorist than to be detoured along a certain highway and to find it has been recently graded to be ready for the detour and is itself as impassable as the highway from which traffic has been diverted. A little more care and attention given in advance to detours will pay heavy dividends in satisfaction to the traveling public.

If opportunity exists, it is much better to provide a detour for one line of traffic and to use another highway for traffic going in the opposite direction; if the roads selected for detours are narrow, this method avoids

WHEN THE HALF-AT-A-TIME METHOD PERMITS ONLY ONE LINE OF TRAFFIC, THIS IS REGULATED BY A TELEPHONE, IN MASSACHUSETTS

many accidents and complications in meeting and facilitates the passage of both lines of traffic. Furthermore, the detour roads are not quite so seriously damaged if the traffic is halved. If there is any question or reasonable doubt, a double detour should be used.

Needless to say, detours should be marked and well maintained. Proper posting of detours does not mean just pointing an arrow at the first turn away from the road under improvement; it means a consistent series of signs directing traffic adequately from beginning to end of the detour. There is no more helpless feeling than that which comes to one lost on a supposed detour at midnight with the rain descending and all the farmers in the neighborhood gone to bed. If all engineers and contractors had been caught in such a predicament, as the writer has been, much greater care would be used in the selection, maintenance and marking of detours.

A good many present-day highways must be detoured when constructed. It is practically impossible to construct a concrete road without detours. The same is true of almost any other road except graveling and grading jobs. The cost of detouring is a very heavy charge on the traveling public. Almost invariably detours are longer than the road under construction. If the road under construction carries heavy traffic, the cost of traveling an extra mile on the detour is very heavy. A detour three miles longer than the main road, carrying a traffic of 800 vehicles a day, means a daily total extra travel of 2,400 miles, which even at 10 cents a day is $240 per day. If the road under construction is kept closed for four months, the cost of detouring will be $28,800, and unless the structure is of such character as absolutely to preclude taking traffic through, any reasonable expenditure in keeping it open for traffic is fully justified.

Whether to detour or not is a matter of special consideration for each particular set of circumstances. Detours should certainly be kept to the minimum both in number and in length, and if necessarily used should be made as safe as possible and as unmistakable as foresight can make them.

ACKNOWLEDGMENT.—Illustrations by courtesy of the Portland Cement Association, Chicago, Ill.

A Glimpse of South America's Largest City

VIADUCT OF SANTA THERESA, RIO DE JANEIRO, BRAZIL

The Principles of City Planning

By Harland Bartholomew
City Plan Engineer, St. Louis, Mo.

CITY planning is that phase of municipal activity which analyzes the character and probable extent of the city's growth, suggests certain physical readjustments and provides for the coordination of all future improvements. Under proper and sympathetic administrative agencies it would make possible the gradual and economical development of an orderly, well-arranged city, which would provide good living conditions for all its citizens, and would be everywhere wholesome and attractive in appearance and free from those physical defects that hamper commercial and industrial activity.

City planning is essentially concerned with the physical development of cities. It has nothing to do with political or administrative policies. The city plan will largely influence, for good or bad, the lives of its people, so long as the city endures. It should transcend all other considerations.

It is a well-recognized fact that modern cities are lacking in unity of design, do not easily promote the expansion of commerce and industry, and have numerous residential districts of doubtful value. The past few years have produced a noteworthy public realization of the deficiencies and mistakes of city growth. Few cities are not now engaged in attempting to correct the evils that are the result of past neglect.

Those things which properly constitute the city plan are six in number:

1. Street system
2. Transit system
3. Transportation (rail and water)
4. Public recreation
5. Zoning
6. Civic art

These are the physical elements which, when properly planned and correlated, make possible the creation of an attractive and orderly working organism out of the heterogeneous mass we now call the city.

In the development of a city plan whereby the growth of a city may be controlled over a period of fifty years or more, we are confronted with the application of these six factors, in

a. Areas now in whole or in part developed with streets, buildings, and customary improvements, and
b. Areas as yet undeveloped and unimproved.

It is far more simple to plan for new growth than to replan areas already developed. The cost of planning new areas is small indeed. To replan areas already developed is often costly, and yet even the cost of replanning is usually more than justified in the greater degree of usefulness which results. A new impetus is given to growth, finding its reflection in increased local property values, and greater public convenience.

The Street System

The street system is the fundamental element of the city plan. It is the skeleton or framework of the city structure. There are three types of streets that every well-planned city should have:

1. Main arterial thoroughfares
2. Secondary (cross-town) thoroughfares
3. Minor streets

The main arterial thoroughfares should be of commodious width (100 feet or greater), and provide continuous and direct communication between the central business district and all parts of the city. They may be compared to the spokes of a wheel, radiating in all directions from the hub. In so far as these main arterial thoroughfares are provided, just so far is communication facilitated and the uniform expansion and growth of a city encouraged.

The secondary or cross-town thoroughfares should be preferably 80 to 100 feet wide, providing easy communication between outlying districts of the city. Where the rectangular form of street platting has been followed, as is the case in most cities, these secondary cross-town thoroughfares should be spaced approximately one-half mile apart. When new growth occurs, they should continue to provide the necessary intradistrict communication, either by extending those which exist or are planned in the built-up portions of the city, and in addition assume the form of concentric circles about the built-up city area, spaced approximately one mile apart.

Minor streets are those which are used chiefly for residential purposes. Their design and arrangement should be such as to facilitate access, but not to provide for or encourage anything but "local" traffic. Widths of approximately 50 feet should be satisfactory, supplemented by set-back lines for all buildings. The platting of minor residential streets should not be of the rectangular type alone. Variation in topography often justifies departure from the rectangular method of platting, and where there is no variation in topography, a slight departure from the rectangular method often affords relief from monotony of development, and a greater degree of interest and charm.

A fourth classification of street type might be added, in what is sometimes called the special service street, such as that serving industrial areas. The width, arrangement, and design of special service streets are dependent upon the service which they are expected to perform.

Transit System

The provision of transit facilities involves various types of carriers, including the street car, the motor bus, the rapid transit line, and the more modern facilities now being developed, such as the trackless trolley. The city plan is not concerned primarily with questions of fare, methods of operation, ownership, or volume of service, except as these questions affect the unified character of the system and its direct relation to the distribution of population and the physical arrangement of the city.

It is a generally accepted fact that the operation of a system, whether privately or publicly owned, is largely dependent upon the street plan. An adequate system of main arterial thoroughfares and secondary cross-town thoroughfares will make possible the plan of a satisfactory system of transit facilities.

A unification of the transit facilities to be provided upon the streets of the city is to be desired and will be productive of best results. With the exception of the largest cities, the great volume of traffic is cared for by a system of street car lines. After an adequate major street plan has been devised, attention should be given to the rerouting of existing street car lines in (a) the business district, and (b) the remaining areas of the city, in order that more direct and expeditious service can be provided. Combinations, rearrangements and extensions of facilities, regardless of their type, can then be planned to meet the needs of a growing city. There will thus be established a definite plan of procedure in place of the more or less common makeshift policies of temporary readjustments.

Transportation—Rail and Water

Steam railroad and water-borne traffic are to be considered under the term transportation. The problems of each city in this phase of planning vary greatly in accordance with the size of the city and the number of railroads and water routes established. There are four classes of traffic to be considered:

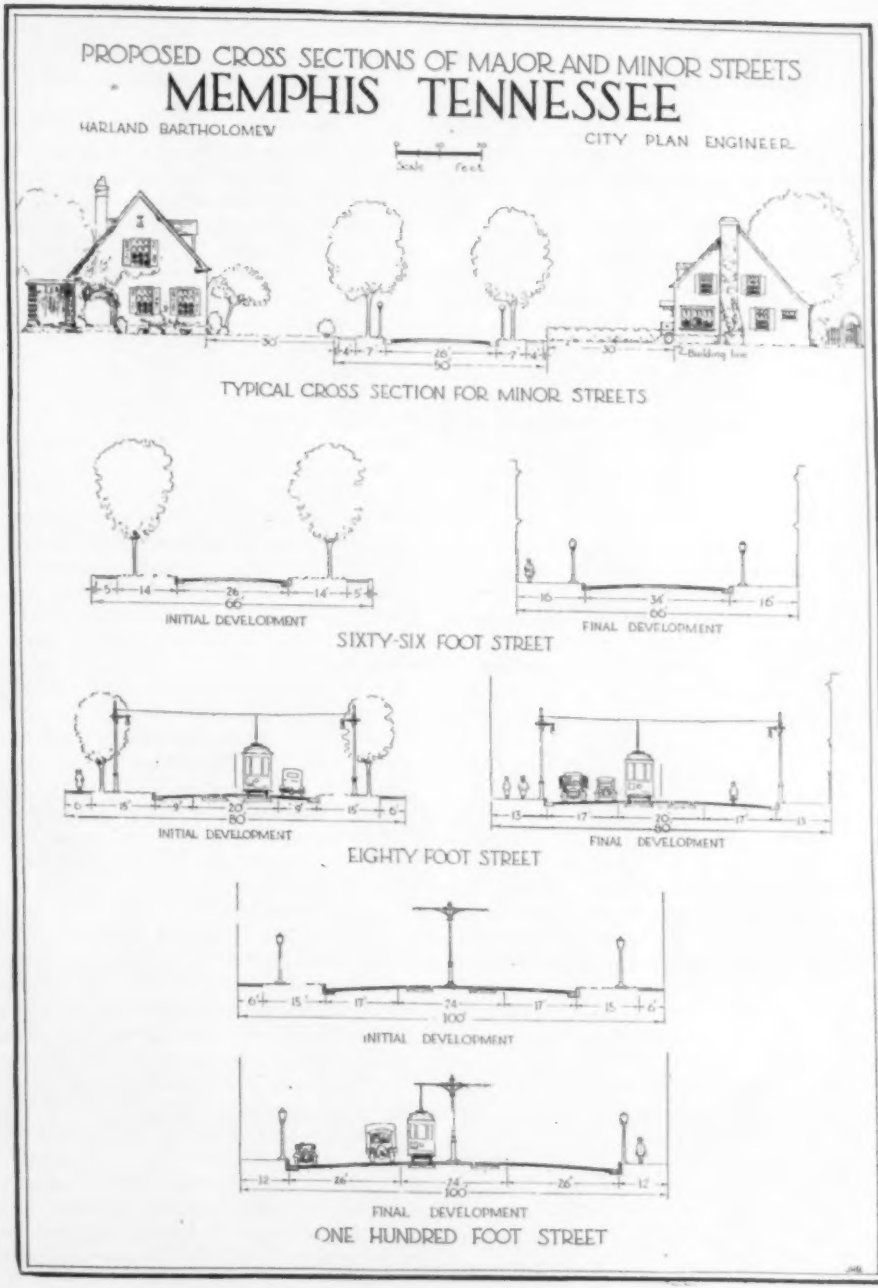
1. Passenger traffic
2. Through car-load business
3. Local car-load business
4. Local l. c. l. (less than car-load) business

Only after a thorough study of the existing conditions in a city, its needs and probable increased growth, can suggestions for adequate planning be made so that new facilities may fit into the general city plan.

There is a marked tendency toward unification of transportation facilities within cities. In so far as unification of service can be provided, this should be done. There are practical limitations upon the early accomplishment of unification of service, such as the expense of wholesale readjustments and undue interference with present highly developed facilities, that necessitate only the most gradual development of unification of facilities.

Unification of passenger traffic facilities has been more customary than for other types of rail and water traffic. Union passenger stations are to be found in many cities and are desirable where practicable. Where more than one station for passenger traffic is found to be necessary, they should be located carefully with respect to the street arrangement, the business district, and the center of population.

Where the freight facilities of a city become congested or a hindrance to the movement of street traffic or to the enlargement of commercial and industrial areas, it will usually prove desirable to locate freight yards outside the developed areas of cities and provide belt lines whereby through freight may be routed around the city with-



STREETS IN EVOLUTION

How wise planning may reserve for later public use space not yet actually required for roadway

out entering it and congesting local terminals.

The location, capacity and arrangement of classification yards should be such as to facilitate early delivery from road movement of local car-load freight to industries and to team tracks. Team track facilities should be properly located and of sufficient size to be somewhat in advance of the needs of the community. Similarly, the facilities essential to the early collection of local outbound car-load freight should be such as to insure early delivery for road haul. This implies reduction to a minimum of rehandling and consequent loss of time and unwarranted cost. As cities increase in size, the volume of local l. c. l. traffic usually increases correspondingly, while the complications of handling l. c. l. freight increase in greater ratio. There is need, therefore, of studying not merely the facilities at hand, but the methods of handling. The relation between the city plan and freight movements is best illustrated by the fact that an improper method of handling may produce an unwarranted number of vehicles upon the streets, while improper locations of freight houses may necessitate hauling of freight through congested retail centers, with which the freight traffic has nothing in common.

Public Recreation

It is only within the past fifty years that the courts have come generally to recognize the necessity for the expenditure of public funds for recreation facilities. So long as we allow people to congest and overcrowd sections of the city, it becomes necessary to provide forms of recreation which people demand but are unable to provide within and about their homes. The several types of public recreation facilities which cities should provide in varying degree according to their size and density of population are:

a. Community centers
b. Children's playgrounds
c. Neighborhood parks
d. Recreation fields
e. Large parks
f. Boulevards and outlying parks or reservations

It is not to be supposed that a city could provide all the recreation facilities that might be created or desired. It is particularly important, therefore, that the city's expenditures for public recreation facilities of various types should be so distributed that the maximum amount of service will be provided for the greatest number of people.

The community center is a well-recognized public recreation agency which also offers splendid opportunities for educational work, Americanization, a forum for the discussion of public affairs, and the like. Properly designed school buildings are the best community centers, particularly since community center activities are greatest in out-of-school hours. Hence the provision of community service is largely a matter of organization and administration rather than of city planning, for it is presumed that school buildings will have been located in accordance with the distribution of school children and hence quite properly fit into the general city planning program.

The first important consideration in devising a system of children's playgrounds is that of selecting sites within congested districts and within easy reach of large numbers of small children. A study of distribution of school children, density of population, and juvenile delinquency throughout the city will readily suggest the location of children's playgrounds.

Neighborhood parks are needed in all residential districts and should be more numerous where population is dense. A study of present and prospective population density and of available park areas will readily suggest where neighborhood parks should be provided.

Large parks and recreation fields are one of the most highly prized assets of cities. Many cities possess such areas, although their acquisition has more often been the result of chance gifts or opportune purchase rather than of conscious effort to provide facilities within easy access for all citizens. All cities should have large parks so located that persons in all parts of the city may find one or more of them easily accessible. Often land unsuited for residential or industrial development and reasonable in price will make splendid park area, enhance the character and value of surrounding property and provide the play facilities so essential to city life.

Once a careful plan for the development of various public recreational grounds has been determined, its gradual execution

should be a matter of fixed policy. In addition to the areas provided within, or adjacent to, the built-up city area, there should be an effort to secure areas in outlying territory while they are still cheap, unspoiled, and in advance of the city's growth. A system of boulevards connecting large parks within developed city areas and extending to the larger outlying parks or reservations, and perhaps having connection with the central business district, will not merely insure the development of a unified recreation system, but will be reflected in a better character of residential development, increased and stabilized land values, and hence increased taxable returns.

Zoning

After the four important elements of the city plan, namely, streets, transit, transportation and public recreation, have been determined and the physical structure of the city thus planned, it becomes a matter of evident reasonableness to regulate property use in all parts of the city in accordance with these several elements. The major streets may, for parts of their lengths at least, quite naturally be expected to become commercial streets. Areas provided with railroad facilities should be encouraged to develop for industrial purposes. Areas now occupied, or expected to be occupied, for residential purposes, having streets planned in accordance with residential needs and supplied with recreation facilities, should most certainly be given the protection essential to their permanency of development through exclusion of industrial or commercial intrusions.

A zoning ordinance will give stability and character, as well as encouragement, to the proper development of the city. A zoning ordinance provides three kinds of regulations, which affect (1) the uses of property and buildings; (2) the heights of buildings; and (3) the size and arrangement of buildings upon lots and open spaces about such buildings. A zoning ordinance will encourage like types of structures within districts to be determined in accordance with their most natural fitness. Zoning ordinances recognize prevailing types of development and are not retroactive in their provisions. Existing buildings and uses of property are permitted to continue, but new buildings must be built in locations set aside for them, sufficiently large and otherwise suited for full and free expansion.

Civic Art

Unfortunately, city planning work has often been erroneously considered as the municipal activity concerned merely with the superficial beautification or enhancement of the city's appearance. From the foregoing explanation of the basic principles of a city plan, it is believed that the economic and social considerations involved are seen to be essentially fundamental. Once the several elements of the city plan heretofore described have been carefully planned and gradually executed there will result greater uniformity of development and a more balanced type of growth, which, in itself, will constitute one of the fundamentals of good design—the adaptation of form to function. To be sure, there are certain considerations that should receive special attention, such as the grouping of public buildings at strategic locations, the regulation of poles and wires, certain regulations of signs and billboards, a careful system of street tree planting, and numerous other similar activities that will add greatly to the city's appearance when properly done.

ACKNOWLEDGMENT.—From the First Annual Report, City Planning Commission, Memphis, Tenn.

Reduced Rates for San Francisco Convention of Fire Chiefs

The various railroads over which fire chiefs will travel from the East and Middle West to attend the International Convention of Fire Chiefs to be held in San Francisco next August have given new rates for convention and tourist travel, effective from May 15 to August 31, 1922. This should materially increase the number of fire chiefs from the East and Middle West who will attend this convention.

Municipal Finance

BONDING **ACCOUNTING** **TAXATION**

Wisconsin's Progress in Uniform Municipal Accounting

THE importance of improved methods of accounting for municipalities was recognized in Wisconsin in 1909, when the Legislature by joint resolution directed the Tax Commission to investigate municipal finances. It was evident from this investigation that municipal accounts were kept in such a manner as to preclude the possibility of comparing results. In consequence, the Tax Commission recommended, and the Legislature enacted, Chapter 523, Laws of 1911. This statute enumerated specifically the duties of the Commission in regard to the collection of statistics and the formulation of a uniform system of municipal accounts. It is in accordance with this statute that the municipal accounting department of the Tax Commission was established and is now operating. This section provides that the Tax Commission shall:

(1) Inquire into the system of accounting of public funds in use in towns, villages, cities and counties.

(2) Devise, prescribe, and at the request of any town, village, city or county install, a system of accounts which shall be as nearly uniform as practicable.

(3) Audit the books of the town, village, city or county officers upon the request of the town or village board, city council, or county board, or upon its own motion.

Under authority conferred by the statute quoted above, a uniform system of accounts has been designed and accountants have been employed to make installations and audits. The system prescribed is complete enough to fulfill all accounting needs of the municipality and at the same time is comparatively simple to understand and to operate. The accounts are especially designed to meet the requirements of the financial reports required by law and conform to the classification approved by recognized authorities on municipal accounting. Up to the present time sixty-one cities and forty-seven counties have voluntarily adopted the system.

In addition to the installation service, one hundred and fifty audits have been made upon request of Wisconsin municipalities. In many cities and counties audits have been made annually for several years. For the most part, the requests have come from city councils or county boards as the case may be, but in some instances where officials have refused to authorize examinations for the reason that their own conduct would be subject to review, audits have been undertaken upon the petition of interested taxpayers.

In addition to disclosing irregularities resulting from ignorance of the law, the audits completed by this department have brought to light actual cash shortages in excess of $100,000 resulting from wilful intent upon the part of officials to misappropriate public funds. The discovery of the shortage usually resulted in the conviction of the official and the recovery of the amount misappropriated. In many instances where discrepancies were found, the general laxity of the governing bodies was in part responsible for the default by making it possible for dishonest officials to cover up manipulations extending over a period of years. In some cases officers were not held to a proper accounting during their entire tenure of office, and in others the systems of accounting in use were such as to encourage them to acts of misconduct. In both of these matters it is entirely within the province of the town or village board, city council, or county board to correct the situation by authorizing an audit by this department or by requesting the installation of the state

uniform system of municipal accounts.

We believe that state supervision of municipal finances has worked to the distinct advantage of Wisconsin municipalities. In the first place, competent auditing and accounting service is made available at actual cost. The accountants engaged exclusively in this work have become specialists and are thoroughly conversant with municipal procedure. Few, if any, private or commercial accountants in the state have handled sufficient municipal work to become as thoroughly qualified in this work as have representatives of the municipal accounting department. In the second place, it is now well established that the many problems peculiar to municipal accounting preclude the possibility of success except under authorized central direction. Without supervision there would be no adequate degree of uniformity. Then, too, municipal officials are constantly changing and some agency must be available from which the new officials can receive assistance relative to accounting matters. An effective follow-up policy, so essential in municipal installations, is a feature of the work and is possible only through the direction of a state agency.

CHART SHOWING WISCONSIN COMMUNITIES AND COUNTIES OPERATING UNDER THE UNIFORM SYSTEM OF MUNICIPAL ACCOUNTING

ACKNOWLEDGMENT.—From a reprint of Bulletin No. 10, October, 1921, issued by the Municipal Statistics Department of the Wisconsin Tax Commission.

The Bill-Board Blight

BILL-BOARDS have been treated in many ways in various pamphlets, but there is a personal side to the relation of the bill-board to the community which has not yet received due attention. Accordingly, the Municipal Art Society of New York has thought it worth while to issue another bulletin dealing with outdoor advertising and taking up the subject from the citizens' point of view. The purpose, as the Society frankly states, is to suggest to every citizen that neither political experience nor legal knowledge is required for a protest to public officials who are responsible for preventing any invasion of the general rights of the public and for protecting civic improvements.

The outdoor advertiser affects us all when he inconsiderately plants a bill-board in such a way as to detract from the beauty of a public park, a fine public building, or a noted thoroughfare. The Municipal Art Society and those cooperating with it take pains to state in their bulletin that they are in no way hostile to legitimate advertising, which is universally acknowledged to be one of the great sources of progress in civilization. But they maintain that those advertisers who use public places as their background have failed to grasp the rights of the public in such places, and have failed to sense the growing irritation and hostility of a very large part of the public towards the unnecessary entrance of bill-board advertising where it does not belong. They hold that outdoor advertising should be limited to those buildings in which the business advertised is actually carried on, and that when a building standing on a corner of a famous or beautiful street is plastered with advertisements, there are two parties who have been injured: first, the tenants of such buildings, who suffer from the loss of dignity which the building inevitably incurs; and, second, the public, who do not wish to be compelled to gaze at such attention-compelling signs. When bill-board advertisers hire space on a famous street like

FIFTH AVENUE AND FORTY-SECOND STREET, NEW YORK CITY, NORTHEAST CORNER, TAKEN IN SUMMER OF 1921

Fifth Avenue, New York, opposite a great public building like the New York Public Library, or when they rent space opposite the public parks and public buildings in hundreds of our smaller cities, they show a contempt for the very civic beauty which their fellow citizens have constructed at so much labor and expense. Their conduct most certainly proves them not only lacking in civic pride and civic obligation, but emphasizes the fact that they do not deserve the patronage of any citizen who desires to make his home and the community as a whole a more attractive place in which to live. The Municipal Art Society puts it bluntly as follows:

"What is the use of erecting, at the public's expense, public buildings of great beauty, if their effects can be lessened by the act of an individual who seems to consider a great city as merely a background for his private interests? What is the use of producing a picture of natural loveliness, such as a beautiful park, and then allowing its borders to be defaced by the kind of advertiser who regards the charm and beauty of a public park as merely a setting for his own selfish business interests? Why should merchants be allowed to spread their advertisements of food and drink and tobacco and tires and clothing over the walls of dwellings where their intrusive statements stare people in the face in their very homes?"

Public officials are unanimous in their testimony as to the insanitary condition which frequently surrounds bill-boards. Street cleaning commissioners state that bill-boards attached to railings cause rubbish to accumulate in front of buildings, that vacant lots surrounded by fences bearing bill-board advertising are gathering-places for paper and rubbish, and that the work of street cleaning departments is greatly increased because of the trash that collects around bill-boards. Police officials likewise report that bill-board structures in many cases offer a screen for lawless and criminal practices.

The bill-board as a highway hazard is discussed in the report of the Motor Vehicle Commissioner for Connecticut for 1921, which states that 348 accidents occurred during the year in Connecticut at places where there were huge advertising signs giving the history of adjacent towns. Motorists driving along had their attention distracted by the sign, and while their eyes were off the roadway other cars came up and collisions occurred.

The bill-board blight is not a question of sentiment alone. It involves the health and safety of the citizens as well as their esthetic views. The latter have their proper place. They are not by any means the only phase of the problem. Promoting public health by city-wide cleanliness, preventing crime and highway accidents, and preserving the value of public parks and buildings are duties which devolve upon city and county officials. In so far as unwisely placed or carelessly maintained bill-boards interfere with the full discharge of these duties, they constitute a real problem to which public officials sooner or later must give serious attention.

DAY IN AND DAY OUT THE DWELLERS IN THIS NEIGHBORHOOD ARE FACED WITH THE WEARY MONOTONY OF THESE SIGNS

A Southern Deep-Well Water-Supply

With Seven Wells in Use and Eighteen in Reserve, Montgomery, Alabama, Is Amply Protected Against Shortage

By H. A. Washington
City Engineer

THE deep-well water-supply of Montgomery, Ala., was purchased from the Capitol City Water Works by the city for $600,000 in 1898. The present total bonded indebtedness of the water department is $975,000, while the total value of the plant is $1,966,800.19.

The water-works have been particularly fortunate in being able to operate from 1898 to date with the same rates that were charged in 1898. The highest domestic rate per 1,000 gallons is 15 cents, with 10 cents the commercial rate per 1,000 gallons and a minimum annual charge of $12. There are 9,593 services, of which 8,191 are metered, making the city 85.38 per cent metered. The average daily consumption is 4,500,000 gallons, or about 104 gallons per capita, the population being 43,464.

QUANTITATIVE ANALYSIS OF SAMPLE FROM GENERAL SUPPLY

Sodium chloride	1.3398
Sodium carbonate	8.7905
Potassium sulphate	0.2053
Potassium carbonate	1.4807
Calcium carbonate	0.5898
Magnesium carbonate	0.2679
Iron and aluminum oxides	0.2436
Volatile and organic matter	0.7640
Total solids	0.9280
	14.6096

The water, an analysis of which is given below, is neither filtered nor sterilized, as it has been found of uniform quality at all times and no softening has been considered necessary:

The seven deep wells which are used throughout the year are in water-bearing sand strata varying in depth from 200 to 600 feet. Water is pumped from the seven wells by Layne & Bowler deep-well rotary pumps direct-connected with vertical motors. The seven units, which have a total daily output of 6,320,000 gallons, discharge into five underground storage reservoirs with a combined capacity of 3,373,000 gallons.

Water is pumped into the mains by two high-pressure Allis-Chalmers centrifugal pumps. Two stand-pipes, having a combined capacity of 1,075,000 gallons, are used to equalize the pressure in the mains. There are 131.94 miles of cast iron main, varying from 4 inches to 26 inches in diameter. For purposes of control there are 1,036 gate-valves, and 685 fire hydrants have been put in.

In addition to the plant already de-

GENERAL VIEW OF THE MONTGOMERY, ALA., WATER-WORKS

The three small white buildings house three of the seven wells and turbine pumps. The large brick building in the background is the old station, housing the emergency steam pump and the air compressors connected with the emergency air-lift plant. Four of the five storage reservoirs also may be seen

scribed, the city holds in reserve for emergency purposes a steam-driven air-lift plant and an electrically-driven air-lift plant, each of which is capable of delivering about 4,000,000 gallons daily from eighteen wells, which are separate and distinct from the seven in daily use. In addition, the city operates a plant for pumping and filtering river water, which is sold to the railroads at a rate lower than the domestic rate.

Laying Cast Iron Feeder Mains in New Orleans

By Thomas F. Wolfe
Secretary, The Cast Iron Pipe Publicity Bureau

UNUSUAL soil conditions in New Orleans make the installation of underground pipes a much bigger problem than usual. The soil in parts of the city is a very tenacious clay full of roots and stumps of what was formerly a swamp. While the roots and stumps constitute a serious problem in excavation work, the greatest difficulty lies in the fact that the excavated material cannot be tossed from a shovel. When the excavation is made by hand, each shovelful of dirt must be passed from one man to another from the bottom of the trench to the spoil bank. Not only must this be done, but, between shovelsful, each shovel must be dipped in a bucket of water in order to make any progress at all.

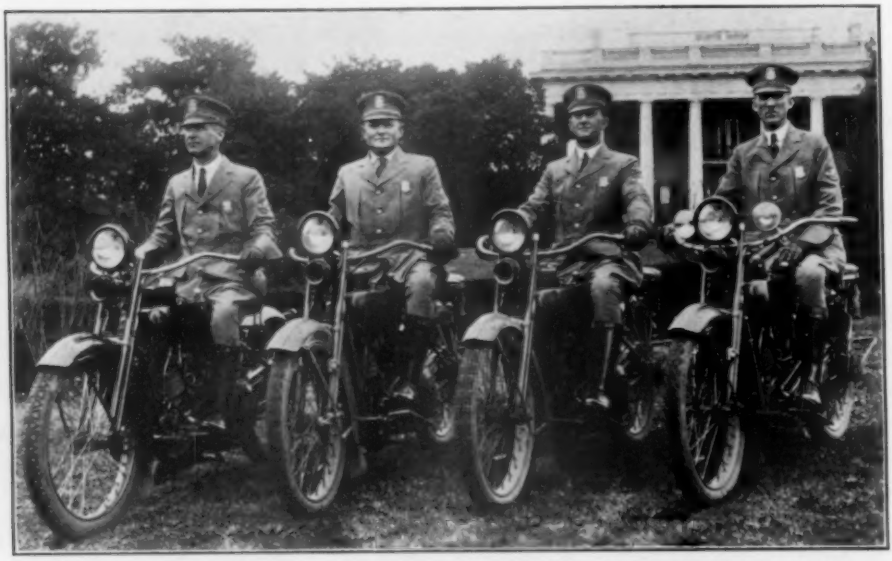
When work was started on laying the 43.31-inch (1.1 meter) cast iron pipe, the excavation was done by hand, but it soon became evident that the use of machinery was advisable, so a clam-shell bucket operated by an Industrial Works crane was put into service with excellent results. Even when a bucket of this kind was used, the tenacity of the clay gave some trouble, until the expedient of keeping a stream of water playing constantly on the bucket was adopted.

The plasticity of the soil made it necessary to use tight sheeting, even though the ditch of the trench was only about 10 feet. Lackawanna steel sheet piling in 16- and 24-foot lengths was used for sheeting, the longer piles serving as a support for the 12- by 12-inch timbers which carried the track for the crane. The accompanying illustration shows the manner of sheeting the ditch and supporting the crane. The sheeting is driven by a pile driver equipped with a steam hammer and pulled by a second driver which follows the pipe-laying gang. The crane, following close upon the forward driver, excavates the ditch and immediately lays the pipe before moving forward. The ditch is then backfilled and the crane moved forward to excavate for the next length. The stumps and roots are seen in the illustration.

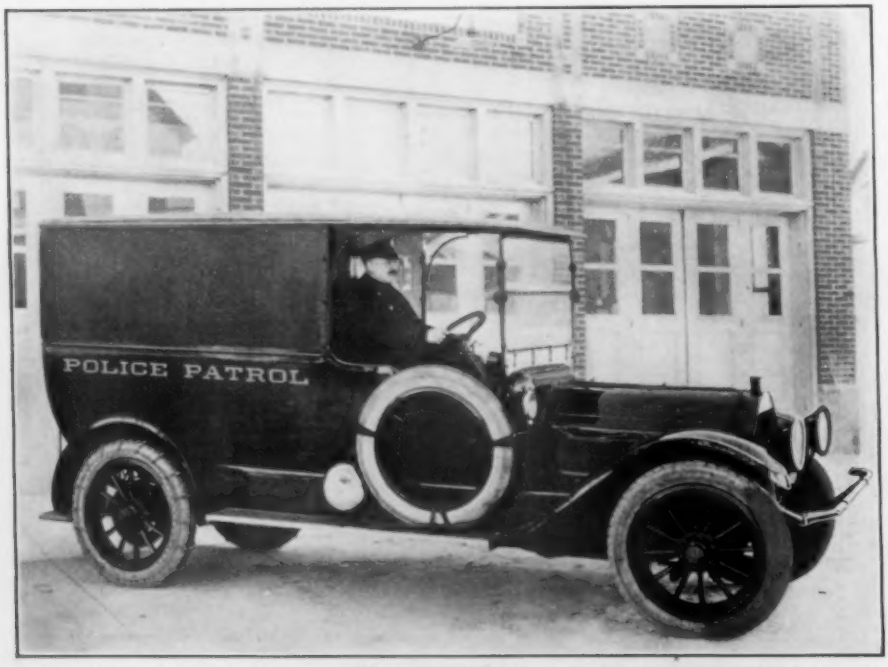
TYPICAL PIPE-LAYING CONDITIONS IN NEW ORLEANS

The soil conditions also make repairs to the mains a very expensive operation, but, fortunately, the work which is done by the Sewerage and Water Board is very carefully supervised, so that little trouble develops. The entire water distribution system of New Orleans consists of Class "B" cast iron pipe, ranging in size from 4-inch to 48-inch.

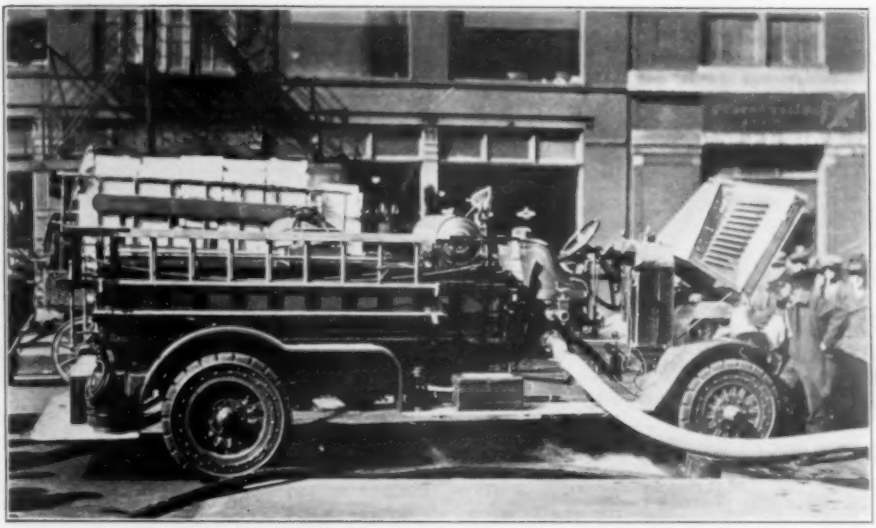
Motors for Police and Fire Departments



THE MOTOR-CYCLE POLICE OF MACON, GA., MOUNTED ON THEIR HARLEY-DAVIDSON MACHINES

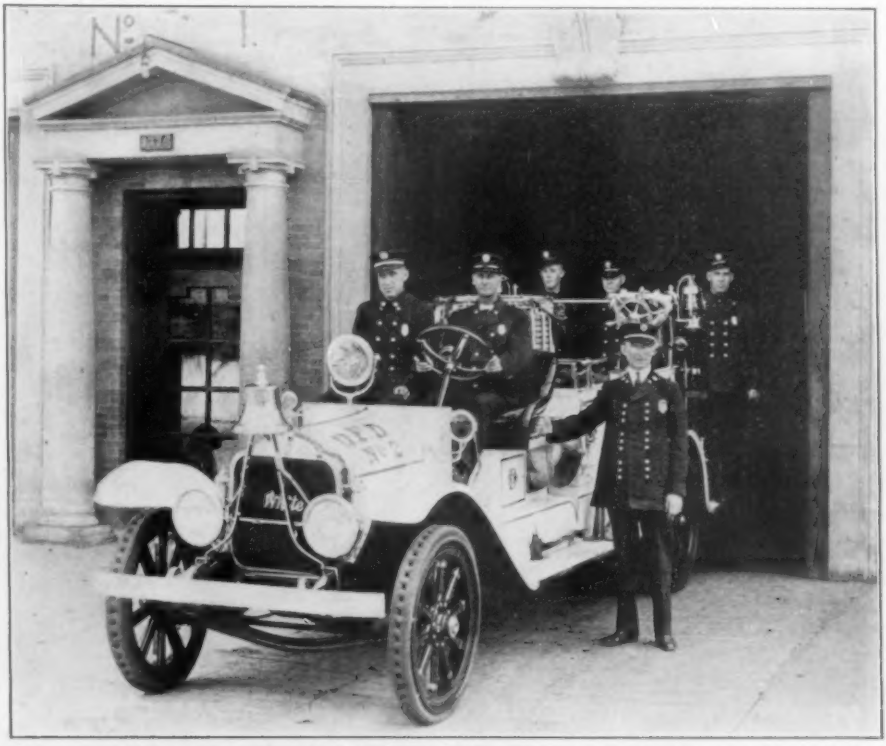


THIS PIERCE-ARROW POLICE PATROL HAS BEEN DRIVEN OVER 160,000 MILES IN THE SERVICE OF THE MILWAUKEE POLICE DEPARTMENT



ONE OF THE MOTOR PUMPERS THAT HELPED CHECK CHICAGO'S GREAT FIRE ON MARCH 15, 1922

This Mack Pumper is equipped with Morand cushion wheels



A WHITE COMBINATION HOSE AND CHEMICAL FIRE TRUCK IN SERVICE IN DENVER, COLO.

The Logical Application of a City Plan in Kokomo, Indiana

By Charles L. Sellers
City Civil Engineer, Kokomo, Ind.

THE city of Kokomo has just witnessed the completion of a big development project that has been carried out in logical city planning order. In 1920 Gerhart Brothers, a local realty development syndicate, purchased a tract of some 46 acres at the western edge of the city, in the direct path of projection of several of the best residential streets, and developed it in a manner that should serve as a model in such enterprises. It has been named "Forest Park."

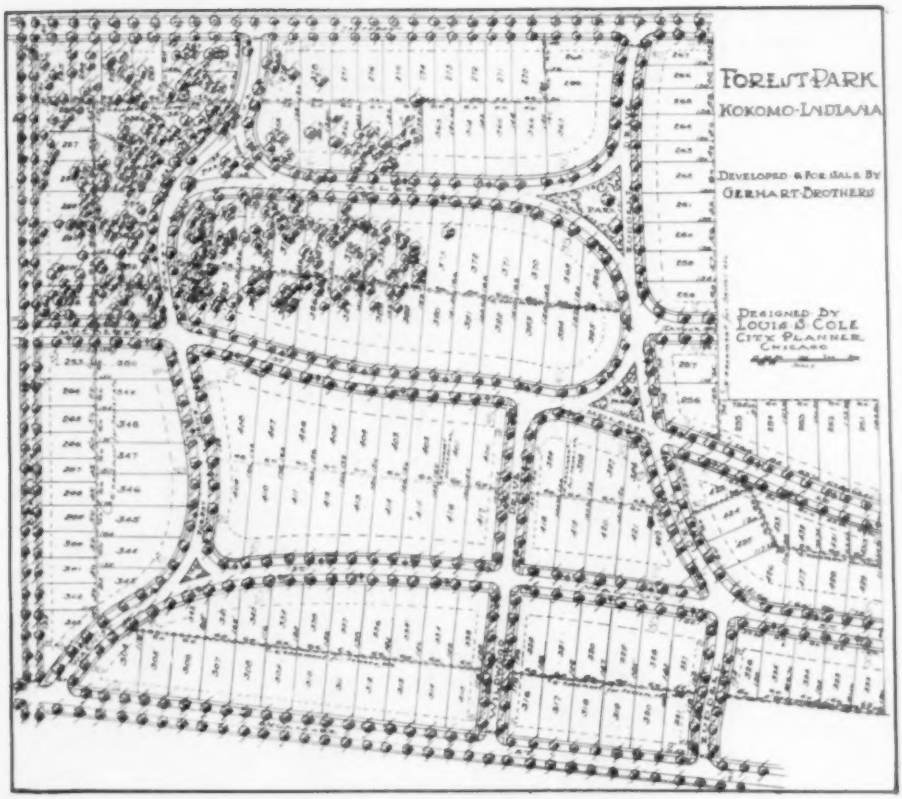
The plan was to create a highly restricted, exclusive residential section, appealing to people of means and refinement. It was decreed that no reasonable expense was to be spared, and the entire project was carefully thought out in advance. First, Louis S. Cole, of Chicago, a landscape architect and city planner, was secured to take general charge of the development. After a topographical survey, a design was submitted that not only took advantage of the natural contour of the allotment, but preserved almost every tree in a beautiful grove of maples, elms and beeches which dotted about one-fourth of the tract. Then the plat—of utmost importance, this—was carefully fitted to the older part of the city in regard to arterial streets.

Installing the Utilities

The plat was submitted to the city and accepted through its engineering department and Board of Public Works. Then the actual development began. The first thing undertaken was the construction of an adequate, carefully planned sewer system of reinforced concrete, large enough and deep enough to meet all possible future needs. The main sewer at a point three-quarters of a mile from the outlet is 6 feet in diameter, leaving the subdivision at the opposite side with a 54-inch tile. The system was so planned that it crossed streets and came under pavements in a few instances only. It was completed in the spring of 1921.

At this juncture the Kokomo Water Works Company installed a complete water system, using 8-inch, 6-inch and 2-inch mains in sequence, and cross-tying the mains in such manner as to provide perfect circulation throughout. Service laterals were installed to each lot in the subdivision, and lead pipes were used in all cases where streets were crossed or where the laterals

A STREET INTERSECTION AT FOREST PARK, KOKOMO, IND.
Note the fine trees and the sidewalk built around one of them



LAYOUT OF FOREST PARK, SHOWING USE OF CURVING STREETS AND TRIANGULAR PARKS
Note the setback lines throughout the development.

would be covered with pavements.

The streets were designed to allow a 13-foot parkway between sidewalk and curb, and it is through this parkway that the water-mains were laid, in order that the pavements need not be disturbed should pipe-line repairs become necessary. The parkway plan is this: the water-mains are 3 feet from the curb; English elms 6 inches in diameter were planted at intervals of 50 feet midway between water-main and sidewalk, locating the tree 5 feet from the main, 5 feet from the sidewalk and 8 feet from the curb, as it was the desire to shade the sidewalk rather than the roadway.

With sewer laterals and water-mains established, the gas company then installed all mains in the easements at the rear of the lot lines, service being provided for every lot. There are no alleys. Domestic, light and power service poles also were placed in these easements, and electric service is brought into the home underground by means of lead cables.

Not until all this was done, not until gas, water and electric services were installed, and the sewer system completed, did the street improvement begin. This improvement included streets, curbs, parkways, decorative parks and street lighting, all in accordance with plans made by the architect in charge. The streets, or drives, consist of a bituminous asphaltic concrete pavement upon a water-bound macadam base. Boulevard traffic only is permitted. While the main drives conform to arterial streets, the general layout is one of sweeping curves, in order not only to enhance the natural beauty of the tract, but to give every home in the subdivision an attractive vista.

Parks occur at frequent intervals and are made possible by the general plan of the

roadways. All the parks are triangular and have been carefully landscaped. Hydrants are provided for all of them, that frequent watering may be done. In the center of the largest park plumbing and drainage have been installed for a fountain. The present plan is to make this fountain a memorial to one of the city's pioneers. It will be shaded by Norway maples, and in each of the three corners of the park stands a Wythe elm, a sentry at the crossways.

The sidewalks are composed of 5-foot slabs of concrete, 4 inches in thickness, laid directly on a rolled clay foundation, with a ¼-inch fall to the street. The sidewalks are underdrained with 4-inch red agricultural tile, which is connected at frequent intervals with another red tile drain under the curb, the whole system draining to catch-basins, making a complete system of rapid drainage for sidewalk and pavement.

The curb is of special design, saucer-shaped, and having a greater water-carrying capacity than the old-style gutter. It does away with the harsh lines of the old-fashioned design, and adds to the safety of motorists. It was found that with curbs of this design narrower roadways could be used to advantage; the curb, which is actually a part of the drive, is sloped so gently that it becomes one with the roadway.

The Street Lighting

Street lighting standards of handsome design have been spaced on both sides of all drives at intervals of 75 feet. These are constructed of reinforced concrete with granitoid surfaces. The reinforcement consists of four twisted iron rods, anchoring to concrete foundations 3 feet deep and 2 feet square. The lighting itself is by charming English lanterns, rich and beautifully quaint, finished in verd de gris antique. The lanterns are 36 inches from the bottom to the top of all ornamentation, and 18 inches in diameter, of special design adopted for Forest Park. Underground cables to the standards are of solid copper in a leaden sheath, the whole protected by spirally wound steel tape. The lighting system is on two circuits, controlled by automatic electrical time switches, providing complete illumination from dusk until midnight, and partial illumination from midnight until dawn.

Considerable interest has been manifested by engineers in the state of Indiana, and in the Middle West generally, concerning the work in Forest Park. It is a plan that will mean not only greater beauty, but actually much greater efficiency at very much lower ultimate cost.

On the Calendar of Conventions

May 15-19.—Philadelphia, Pa.
American Water Works Association. Annual convention. Secretary, J. M. Diven, 153 West 71st Street, New York, N. Y.

May 15-19.—Atlantic City, N. J.
National Electric Light Association. Annual convention. Executive Manager, M. H. Aylesworth, 29 West 39th Street, New York, N. Y.

May 15-21.—Washington, D. C.
Chamber of Commerce of the United States. Annual meeting. Secretary, D. A. Skinner, Mills Building, Washington, D. C.

May 17-18.—Waxahachie, Tex.
League of Texas Municipalities. Annual convention. Secretary, Frank M. Stewart, Bureau of Extension, University of Texas, Austin, Tex.

May 22-23.—Plainview, Tex.
West Texas Chamber of Commerce. Annual convention. Manager, Porter A. Whaley, Stamford, Tex.

June 5-7.—Springfield, Mass.
National Conference on City Planning. Annual conference. Secretary, Flavel Shurtleff, 60 State Street, Boston, Mass.

June 5-9.—Los Angeles, Calif.
International Association of Rotary Clubs. Annual meeting. Secretary, Chesley R. Perry, 910 South Michigan Avenue, Chicago, Ill.

June 6-7.—Antigo, Wis.
Wisconsin Association of Commercial Secretaries. Annual meeting. Secretary, D. A. Caldwell, Chamber of Commerce, Wausau, Wis.

June 6-8.—Poughkeepsie, N. Y.
Conference of Mayors and Other City Officials of the State of New York. Annual convention. Secretary, William P. Capes, 25 Washington Avenue, Albany, N. Y.

June 9-10.—Swampscott, Mass.
New England Association of Commercial Executives. Annual meeting. Secretary, Price Gaines, Chamber of Commerce, Keene, N. H.

June 19-24.—San Francisco, Calif.
International Association of Chiefs of Police. Annual convention. Secretary, George Black, Chief of Police, Wilmington, Del.

June 20-23.—Colorado Springs, Colo.
National Association of Comptrollers and Accounting Officers. Annual convention. Secretary, Mark M. Foote, Comptroller's Office, Chicago, Ill.

June 21-22.—Crookston, Minn.
League of Minnesota Municipalities. Annual convention. Executive Secretary, Morris B. Lambie, The Municipal Reference Bureau, University of Minnesota, Minneapolis, Minn.

June 21-22.—Stroudsburg, Pa.
Association of Pennsylvania Boroughs. Annual convention. Secretary, J. Herman Knisely, Capitol Building, Harrisburg, Pa.

August 15-18.—San Francisco, Calif.
International Association of Fire Engineers. Annual meeting. Secretary, James J. Mulcahey, City Hall, Yonkers, N. Y.

September 12-15.—New Bedford, Mass.
New England Water Works Association. Annual convention. Secretary, Frank J. Gifford, 715 Tremont Temple, Boston, Mass.

October 9-13.—Cleveland, Ohio.
American Society for Municipal Improvements. Annual convention. Secretary, Charles Carroll Brown, P. O. Box 234, St. Petersburg, Fla.

Chamber of Commerce Activities in Public Affairs

Chamber's Engineer Saves City Money in Paving Work

NEW ORLEANS, LA.—The Board of Directors of the New Orleans Association of Commerce early in 1919 appointed a committee to call on the Mayor and urge the paving of the necessary arteries in the section bounded by the river and Camp, Canal and Thalia Streets. The Mayor informed the committee that the city could do nothing at that time because of the depleted condition of the treasury. The committee therefore recommended to the Board that the project be temporarily abandoned.

The Members' Council of the Association of Commerce, however, appointed a committee to go directly to the property owners in the wholesale district and obtain signatures to a petition. The committee then made a thorough study of the city's finances, with the result that a plan was devised whereby the money needed to cover the city's proportion of the paving cost could be furnished. The petition and the plan for financing were presented to the four city commissioners, who agreed to undertake the work.

The project has never been permitted to lag and is now actually completed. At the very beginning, the Association of Commerce formed a committee known as the Business Men's Paving Committee, consisting of interested wholesalers. This committee has held regular weekly meetings to discuss the progress being made.

A unique feature of these meetings was that they were attended by one of the most competent engineers in the city, who was retained by the Association of Commerce to give the committee expert advice and to see that the paving contractor lived up to his specifications in the quality of material used and the methods employed in doing the work. A spirit of coöperation with the city officials has prevailed throughout the committee's activities, and the weekly meetings are oftentimes attended by the City Engineer and the Commissioner of Public Property, who come to confer on various steps to be taken.

POYDRAS STREET, NEW ORLEANS, IN PROCESS OF REPAIR
These heavy granite blocks were relaid as a base for the new pavement

POYDRAS STREET COMPLETED

City officials and business men generally agree that the Association of Commerce has saved the city and property owners several thousands of dollars by this rather unusual method of lending organized assistance in successfully completing a big paving project.

CHARLES E. WHITE,
Publicity Department, New Orleans Association of Commerce.

A Chamber of Commerce Fuel Yard

Sharon, Pa.—The Chamber of Commerce of Sharon during the winter has developed a practical scheme for furnishing fuel to citizens in distress from unemployment. Early in the fall, the Chamber anticipated the need of being able to furnish fuel to those out of work. Through the cooperation of the railroads five car-loads of old ties were shipped to Sharon and placed in what is known as the Chamber of Commerce Fuel Yard.

Up to January 21, wood had been delivered to 84 families. At that time it was found necessary to send a letter to the membership requesting donations to the Fuel Fund, to furnish coal for needy families. The letter met with a splendid response. The request had been for money to buy 200 tons of coal. In a few days enough money had been received to buy 300 tons. In the month following this request over 200 loads of fuel were delivered to citizens who otherwise would have suffered.

The Chamber was obliged to enter upon this form of relief work to support the existing charitable organizations, whose funds have been insufficient to meet the extraordinary demands of the current winter.

P. A. JONES,
Executive Secretary, Chamber of Commerce.

Rome's Rest Room

Rome, N. Y.—The Rome Chamber of Commerce is proud of the public rest room. It is used by hundreds of men and women, for it stands at the terminus of seven bus lines, some of them giving hourly service to towns eighteen or twenty miles away.

The room is very handsomely furnished. There were definite reasons for spending extra sums in making the place attractive. It scares away the loafer who might be looking for a "hangout." One look tells him that it is no place for him or his kind.

THE UNUSUALLY ATTRACTIVE FURNISHINGS IN ROME'S REST ROOM SCARE AWAY THE LOAFER

The furnishings are also intended to emphasize the rest room idea, and to prevent the place from degenerating into a mere autobus waiting-room.

The room has been supported by voluntary contributions from Rome merchants. The concession for the selling of tobacco, papers, etc., pays for the superintendence. The concession is operated by a man and his wife, the man being on duty morning and evening, and his wife in the afternoon. A free checking service is maintained. Here tourists or shoppers can check packages or luggage. Purchases can also be checked at any store in town, and later called for at the rest room, if so desired.

E. D. BEVITT,
Secretary, Rome Chamber of Commerce.

Knoxville Board Installs Street Signs

Knoxville, Tenn.—The street signs purchased by the Knoxville Board of Commerce have just been installed. The accompanying photograph shows W. J. Savage, President of the Board of Commerce, placing a set of the new signs on the Hotel Farragut. At the bottom of the ladder is Postmaster W. P. Chandler, Chairman of the Board of Commerce Street Signs Committee, Mayor E. W. Neal, and J. T. Badgley, Manager of the Board of Commerce.

Street signs for the more than 1,200 Knoxville street intersections were purchased by the Board of Commerce with a special fund raised by the Street Signs Committee. The signs were put up by the city. In the business district they were placed on the buildings, as shown in this picture. In the residential sections the signs were screwed to strong, oak boards

which were nailed securely to telegraph or trolley poles.

The Street Signs Committee of the Board of Commerce was composed of men who, for various reasons, saw the urgent need for new street signs. The first step was to prepare a list of street intersections, so that the committee could know the exact sum it would need to raise. A list of firms and individuals who would profit most by the erection of new signs was then compiled and divided between the several groups of the committee. Funds were solicited not merely on a civic basis, but also as a business proposition. The committee called the attention of firms with large delivery services to the fact that they were losing time and money every day because many of the streets could not be found by their delivery boys. This appeal was very effective, and the necessary fund was quickly raised, in amounts ranging from $5 to $100.

Knoxville's growth has been rather rapid, with the result that several communities which ten years ago were separate suburban sections are now a part of our solid city. Each community has its own street names, which made a duplication of names in Greater Knoxville.

The Street Signs Committee is using the ordering of new street signs as an occasion for renaming streets whose names are confusing. Signs for those streets will not be ordered until the City Commissioners officially determine the correct names. The Board of Commerce committee feels that this elimination of conflicting street names is as important as was the erection of the new signs, indispensable as they were.

THE PRESIDENT, THE MANAGER, AND THE CHAIRMAN OF THE STREET SIGNS COMMITTEE OF THE KNOXVILLE BOARD OF COMMERCE, AND THE MAYOR, LOOK LIKE A PRETTY EFFICIENT SIGN-POSTING CREW

The committee also wrote to the occupants of every home or business house in Knoxville which was not numbered or was incorrectly numbered, urging that correct numbers be put on their houses. This did not bring a unanimous response, of course, but did result in the correction of a large majority of the mistakes.

CARLOS C. CAMPBELL,
Assistant Manager, Knoxville Board of Commerce.

Quick Work in Santa Rosa

Santa Rosa, Calif.—When Santa Rosa awoke, on the morning of November 16, to find her 485 high school pupils "homeless," the high school building having been completely destroyed by fire, the Directors of the Chamber of Commerce immediately called a meeting with the Board of Education, and without parley made a survey of the most strategic location for rebuilding the school. Long before the embers of the old school had ceased to smoulder, the Chamber of Commerce had an option on sixty-five acres of property at the north city limits, which it later purchased and is holding in trust for the new high school district. This district has been created by combining the city with twenty-five adjacent common school districts, and embodies about one-third of the county's population. Private interests were sacrificed, real estate commissions were waived, and leases cancelled, and there was one of the finest manifestations of community spirit that have ever been recorded in northern California. The result will be a half-million-dollar school project within a few years, making Sonoma County a leader in educational advantages.

The new school property adjoins the Luther Burbank Creation Garden, which comprises thirty acres and was purchased jointly by the city of Santa Rosa and the Chamber of Commerce. Last September it was officially dedicated to the memory of the world-known scientist, Luther Burbank. It is planned to have Mr. Burbank participate in planting there specimens of his horticultural and agricultural creations and improvements, and at some future date to build in the gardens a large community auditorium. Both the Garden and the new school site are located on the Redwood Highway.

Santa Rosa's plan of work for the coming year involves a movement for the city manager form of government; a campaign for new grammar school buildings, in addition to the new high school; an effort to equalize both city and county taxes; a resumption of the old pre-war custom of holding an annual Rose Carnival, beginning in May of this year; and decided improvement in city beautification, street paving and lighting.

JAMES G. STAFFORD,
Secretary, Santa Rosa Chamber of Commerce.

Transforming a Dump into a Playground

Guelph, Ont.—Thanks to the enterprise of the Chamber of Commerce, the city of Guelph has rid itself of an unsightly dump and acquired in its place an attractive playground for its children.

WHAT THE GUELPH CLEAN-UP COMMITTEE FOUND

During a spring clean-up campaign, Mrs. C. R. Crowe, Chairman of the Clean-Up Committee, reported the conditions on a triangular piece of ground in the part of the city known as Brooklyn, and suggested that the Clean-Up Committee convert it into a modern children's playground. The Chamber of Commerce got back of the plan, and many of its members joined with the Committee personally in clearing up the brushwood. The unsanitary and unsightly drains at the foot of the property were properly piped, and the area was filled in with earth brought from other parts of the city where the municipality was making excavations. Then on top was placed a layer of cinders, and the whole place was rolled and put into shape. Playground equipment was in-

AFTER THE CHAMBER TACKLED THE DUMP

stalled, including a box chair swing, a slide and a circular swing.

The Chamber has further plans for making the playground more park-like. Perennials have been planted in the corners of the park, and the willow trees that fringe the river's edge will be removed, to give a better view.

H. WESTOBY,
Secretary, Guelph Chamber of Commerce.

Oregon Town Builds 8,000-Foot Sea-Wall

SEASIDE, ORE.—Under the leadership of the Seaside Breakwater Association, a business men's organization of this city, a great concrete sea-wall has been built, at a cost of about $150,000. This sum was raised by a bond issue. The wall is 8,000 feet long, with a 14-foot promenade.

Even before this development was completed, Seaside was the principal ocean resort on the coast of Oregon, and was visited annually by thousands of people. It is located on the Clatsop Beach branch of the Spokane, Portland and Seattle Railway, 18 miles south of Astoria and 118 miles from Portland. The Clatsop Beach branch is one of the few rail lines touching the Pacific coast of Oregon. This advantage of transportation, the natural excellence of the beach, and the construction development carried out at Seaside have combined to place this region among the leading Pacific resorts.

The original plans called for a promenade built of asphaltic concrete 4 inches thick, but this was later changed to a concrete walk 4 inches thick and of the usual sidewalk construction. A turn-around bay for automobiles was built at the foot of the main business street. This bay may be seen in the distance in the accompanying illustration. Considering the fact that the permanent population of Seaside is only a few thousand, this achievement shows remarkable enterprise on the part of the townspeople who undertook the development.

O. C. HAGMEIER, M. D.
President, Seaside Breakwater Association.

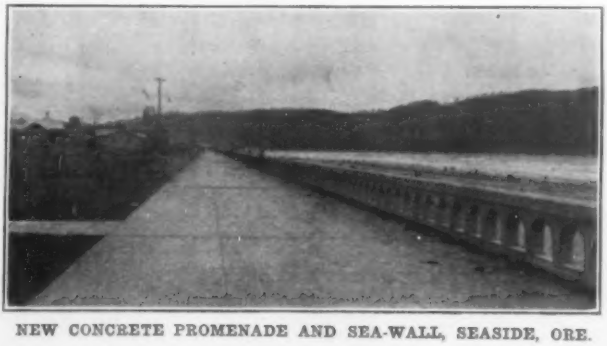
New Auditorium Will Seat Three-Fifths of Town's Population

PLAINVIEW, TEX.—The total population of Plainview at present is less than 5,000; the municipal auditorium, on which work is rapidly progressing, will seat 3,000. It is believed that it is the largest auditorium to be found in any city of its size in the world.

The town sent seventeen men to represent it at the last Convention of the West Texas Chamber of Commerce, a commercial organization with a paid-up membership of nearly 7,000. When the question of the location of the 1922 convention came up, Plainview bid for it. The Convention immediately asked the Plainview delegation if they had a building large enough to hold a gathering of 3,000 to 4,000 delegates. The answer immediately came back, "No, but we will build you one." And the Convention took them up.

Plainview immediately set to work to back up its promise. A bond issue was carried by an overwhelming vote, and the work is now going forward.

In the main auditorium there is a stage 36 feet in depth, with an opening of 60 feet, a scenery loft and the necessary dressing-rooms. In the front of the building and on each side of the main entrance are two large rooms, one set apart for the Public Library and the other for the Chamber of Commerce. The arrangements for heating and ventilation are of the latest designs, and all modern conveniences are provided. The building is located on the main business street, sufficient ground having been purchased to allow parking on each side of the building.



NEW CONCRETE PROMENADE AND SEA-WALL, SEASIDE, ORE.

ARCHITECT'S SKETCH OF NEW MUNICIPAL AUDITORIUM, PLAINVIEW, TEXAS

A building seating 3,000 persons in a town of 5,000

The date set for the next Convention of the West Texas Chamber of Commerce is May 22. On that day Plainview is planning to entertain a gathering equal to its entire population.

R. P. SMYTH,
City Engineer.

A Prize-Winning Easter Egg Hunt

Muncie, Ind.—The second annual Easter egg hunt in Muncie was held on Saturday, April 22, in McCullough Park, by the Dynamo Club of the Muncie Chamber of Commerce, which is composed of 110 of the young men of the city. All the children of Delaware County from the ages of 3 to 12 years were invited to participate in this event. About four thousand people took part.

Five acres of McCullough Park were reserved for the hiding of the eggs. Out of this space a section of approximately 600 square feet was reserved for the little tots from three to five years of age. There were 1,500 eggs hidden in the grounds reserved for that purpose. Out of that number, 1,250 bore prizes offered by the business men of Muncie. Each prize-bearing egg had a sticker pasted on it with a number corresponding with the number of a prize.

The children were gathered in a section directly across from the territory where the eggs were hidden. At the ringing of a bell by Mayor Quick, all the children rushed across to the hunting-grounds. When a child found an egg bearing a number, he went to the prize booth, which was in charge of the Dynamo Club members, and got an order for the prize which bore the number corresponding to the number on the egg. No child could receive orders for more than one prize at a time but, after having received a prize, could go back and hunt for more eggs.

Because quite a number of the children usually stray away from their parents, the Dynamo Club had a booth to which all the lost children were brought and where any parent could claim his or her child. This booth was in charge of the Boy Scouts, Girl Reserves and Dynamo Club members.

This hunt has proved to be a great success in the way of affording pleasure to thousands of people, of creating community spirit, and bringing into direct contact the city and country people of Delaware County.

E. H. HYMAN,
Manager, Chamber of Commerce and Commercial Club.

There were 508 less fires and 122 less false alarms in Detroit in 1921 than in 1920. Also, the fire loss in this city was approximately $1,000,000 less.

Municipal Water Rates—Part III

[A Thorough Analysis of Present Rates and Rate-Making

By E. E. Bankson, D. E. Davis and C. A. Finley *

A Proposed Method for Distribution of the Burden

THE usual assumptions underlying the construction of rates are that the total revenue to be derived may be divided into three broad classifications which roughly correspond to the costs. These are the consumer costs, demand costs, and output costs. The consumer costs are taken as those costs (actually derived from a study of the company's books) which cover the reading of meters and billing of charges, bookkeeping costs, stationery, and those costs which have no reference to the quantity of water used by the consumer, but which are practically the same for each consumer regardless of size.

The demand charge in bulk is assumed to cover such costs as have to do with the possible peak load demands on the plant, such as fires or sudden large momentary uses of water. Since the investment in nearly all elements of the plant, including the distribution system, is necessarily much greater, in order to care for peak loads, than would be true for uniform, non-fluctuating loads, it has usually been assumed that all charges connected with the investment, such as interest charges, are included in this category. A portion of the time of certain executive officers is also thought of as being properly chargeable to this account. Having determined the bulk figure, the distribution to the individual consumers is usually effected by finding the total "capacity" of the individual consumers on the assumption that the area of the service lines or meters supplying the property is a fair measure of the demand which the consumer may make upon the system. When this individual capacity charge is found, it is usually combined with the "consumer charge" in order to form a "service charge" usually based on the size of meter. In practise the strict application of the theory is usually considerably modified by the introduction of a more or less arbitrary diversity factor.

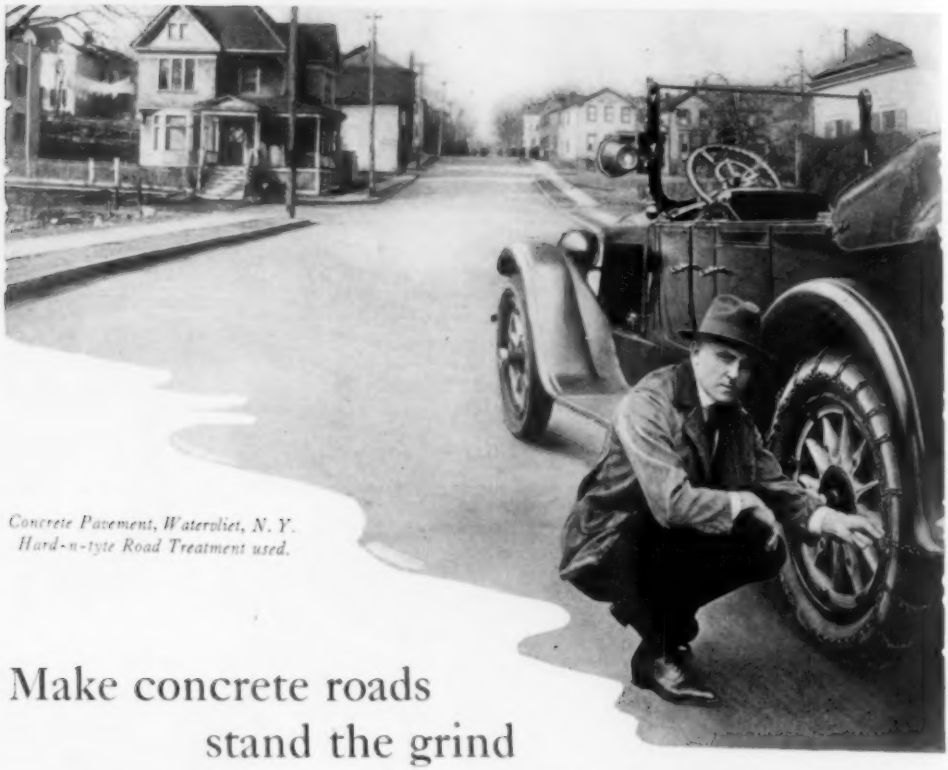
The "output charge" covers such costs as fuel, labor of station employees, chemicals, etc., and varies strictly with the quantity of water pumped. The larger the pumpage, the lower this cost.

There is little dispute as to the fact that these three general classes of costs do apply in a water-works plant, and the only divergence of opinion will arise as to their derivation and constitution, and their equitable distribution into a rate schedule, when once determined. It is in the desire to stimulate further discussion of this problem and in the hope that ultimately a more-or-less standardized method of procedure may be derived and agreed upon, that this discussion has been undertaken.

When the foregoing premises are examined, little objection can be suggested to the methods employed in arriving at or in distributing the "consumer charge" or the "output charge," but when the "demand charge" is similarly examined some of the present methods appear open to question on both counts. It may as well be conceded at this point that no hard and fast rule may be employed in the making of the final rate, and that considerations other than those dictated by pure theory must oftentimes be consulted in arriving at the final determination. The making of a rate involves judgments of a judicial character, and questions of expediency often modify the rate derived from a disinterested study of the conditions at the plant. However, in the building of the rate it will probably be conceded that reasonable assumptions corresponding as closely as possible to the known conditions of the plant should be employed. There are several premises in the methods used in deriving and distributing the "demand charge" which appear to the writers not to correspond with the ordinary observable conditions of plant operation.

What are these conditions which are common to all plants and are a matter of every-day acceptance in their operation?

* E. E. Bankson, of The J. N. Chester Engineers, Pittsburgh, Pa.; D. E. Davis, of The J. N. Chester Engineers, Pittsburgh, Pa.; C. A. Finley, Managing Engineer, Bureau of Water, City of Pittsburgh.



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As to the physical aspects, they are essentially these: The plant at a given time furnishes an average daily quantity of water which remains fairly constant from year to year. There is, however, a very wide variation in the consumption during any one day, the minimum being at night, and the maximum usually about 10:00 A. M. There is also a seasonable variation; the summer demands and the winter peaks usually exceed considerably the average consumption. Finally, each plant recognizes the possibility of a set of circumstances which may put a very heavy demand on the plant for a brief period, and in addition to these considerations, there is always the possibility that the plant may be called upon to supply water for a heavy conflagration.

On the back-of-the-counter side of the water-works office there is another factor which can be counted upon with the same degree of certainty as the average annual consumption. This is the assurance, built up during a long association with the conditions of water-works practice, that the consumers can be depended upon to continue their use of water, and consequently that the money will come over the counter in a fairly uniform stream from year to year, the growth of the population being taken into consideration.

These are well understood characteristics which are common to the personalities of all plants, but in the casting of many rates these conditions have not had an opportunity to reflect themselves, having been replaced by theoretical assumptions which do not correspond with the facts.

The justification for the service charge as advanced by its advocates starts with the idea that the utility must meet certain fixed and administrative charges whether water is delivered to the consumers or not. It is implied, therefore, that there should be a certain stated charge made against each consumer over and above the charge for water, and that this should apply whether any water is used or not. This idea seems to be entirely reasonable when properly applied, because there are certain investment charges applicable against the consumer's specific installation for which the utility should receive adequate return in the rates secured from him, and which conceivably a charge against consumption alone would not always cover. However, the strict application of the usual theory would build up such a large service charge as to make this portion of the consumer's bill the largest item in the case of the majority of consumers. This would be true because in the ordinary case most of the fixed charges are thrown into this item. After the fire protection charge to the city (which is chargeable against this item) is taken out, the amount still levied upon the consumer is high.

The fallacy in this premise—or so it appears to the writers—lies in the assumption that the whole of the fixed charges should be placed in the demand classification. This idea neglects the obvious fact that the plant is constructed not only for a large demand but primarily for day-to-day service to consumers. Furthermore, the habits of the consumers are fairly well established and quite constant. The assumption that they as a body will suddenly cease to use water, is strictly opposed to the facts; the revenue, however the rate is formed, has the habit of coming into the office with due regularity.

All that the utility can reasonably expect is that a sufficient charge in the form of a service rate be assessed against the consumer to cover the legitimate costs of investment assessable against him, so that if for some reason, such as absence on vacations, his consumption becomes abnormally low, there will still be enough revenue derived to carry his account.

To point out other apparent defects in the present theory and to suggest possible remedies, it will be necessary to enter into a discussion of some of the details of rate-making. Admitting that the element of judgment must enter into the determination of the form of the rate finally adopted, it certainly will be desirable to fix limits within which this function may operate. In order to fix the lower limit, it will be convenient to inquire as to what would be the minimum investment required for supplying the water to consumers.

It is obvious that the absolute minimum investment would be the one in that plant which would be required to work regularly, uniformly and continuously for 24 hours per day, 365 days per year, delivering the total required quantity, but uniformly, and not as at present—as demanded. Such a condition might be conceived if each consumer were thought of as having a storage tank which would equalize all of his fluctuations and into which the utility would deliver

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water at a uniform rate. Obviously, the plant investment for this arrangement would be much less than for the plants actually erected, and this condition would extend from the pumps to the filters, buildings and distribution system and would include some reduction even in the size of the consumer's meter and sometimes his service line. This would be the absolute minimum for a plant which would render average day-to-day service, and it is our belief that at least this much of the investment (and probably more) will be required for ordinary service. The utility could not get along with less.

If this be granted, and if it is also conceded that the principal reason for the existence of the plant at all is the serving of the daily needs of the consumer, it would seem that this much at least of the fixed charges on the plant investment is chargeable directly against the consumption, since in such a plant the summation of all consumptions (or total annual consumption) when divided into the total fixed charges would represent the price per unit which, when applied to the consumption of each consumer, would fix the proportion of the whole cost which he should bear. This charge, then, is strictly proportional to the actual average consumption. Contrary to the usual practice, it would then seem that this cost should be made a part of the output charge, which is made on the basis of actual consumption of water.

A good example of a minimum plant as regards the water-supply element in plant investment would be a gravity supply with a reservoir large enough to supply all deficiencies in stream flow. Any hourly or day-to-day fluctuations in load would affect such a large reserve not at all; the same reservoir would be required whether the consumptions were uniform or fluctuating, and the fixed charges against a storage reservoir would therefore appear entirely in the output charge.

Having now allocated into "output charge" certain elements of cost which in the past have been considered as applicable to "demand" and have been made up into the "service charge," there remain certain costs which admittedly should be included under the "demand" heading. A suggested method of dealing with these costs will now be discussed.

The method proposed is that of splitting up the plant investment into various categories representing like service, such as pumping station and accessories, filtration plant, reservoirs, carrying mains, gridiron distribution system, and services and meters. This having been accomplished, the next step involves a study of the probable relation between the normal use and the maximum demand on each element. This may best be illustrated by example.

An examination of the pumpage record of the plant is made and the average daily pumpage determined, as is also the maximum hour's pumpage at any time during the year. If a record of pumpage during a heavy fire can be found, this is also recorded, or else the maximum pumpage possibilities of the plant are used. Assume that the results are as follows:

Average daily pumpage rate....	1	mil. gals.
Maximum hourly pumpage rate	2	mil. gals.
Fire rate	2½	mil. gals.

Then for convenience the investment costs would be broken up $\frac{1}{2.5}$ to output charge, $\frac{2-1}{2.5}$ to demand charge and $\frac{2.5-2}{2.5}$ to fire protection service. A little consideration of the activities of the average water-works plant will indicate that there may be and usually is a wide variation between the demands of the various elements of the plant. These will also vary with the size of the plant; the larger the plant, the smaller the variation. The greatest fluctuations will occur the nearer the consumer is approached, and the diversity factor or ironing-out effect becomes more pronounced the nearer to the source of supply.

It is practically impossible and really unnecessary to determine the actual demand of each consumer, but it will be sufficiently accurate to consider the different classes of consumers based on the sizes of their meters. As a measure of the demands of various consumers we have employed the study of this subject as made by the committee on meter rates for the New England Water Works Association which appears in the December issue of the 1916 *Journal*. The entire fixed charge on all meters is first allocated to the various groups of meters, and the amount to output and to demand is fixed by reference to the relation between average use and maximum demand. It is assumed for convenience that the in-

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HYPOTHETICAL WATER COMPANY, 50,000 POPULATION—APPORTIONMENT OF CHARGES

Meter Sizes		⅝"	¾"	1"	1¼" & 1½"	2"	3"	4"	6"	Total
Number of Consumers	.....	7,750	840	379	69	68	27	17	12	9,162
Number of Meters	.....	7,817	846	383	74	75	32	20	14	9,261
Annual Consumption—Mil. Gals	.....	414	114	125	54	118	208	248	348	1,629
Average Consumption per Meter—Gals	.....	53,000	135,000	327,000	730,000	1,575,000	6,500,000	12,400,000	24,900,000	163,000
Fixed Charge on Meters	$13,417	$10,500	$154	$910	$217	$343	$287	$362	$644	$13,417
Ratio: Output 38, Demand 134, Fire 0	.....	116/705	580/1200	1700/2050	11/35	55/76	111/139	20/40	9/13	
–Distribution to Output	.....	1,728	75	755	161	249	207	180	445	3,800
xDistribution to Demand	.....	8,772	79	155	56	94	80	182	199	9,617
xRepairs to Meter—Demand	$16,000	$12,525	183	1,085	259	408	342	431	767	16,000
Fixed Charge on Gridiron	32,165	.....	.....							
Output and Demand	.....	13,070	1,414	640	116	115	46	29	20	15,450
–Output	.....	6,870	832	426	78	77	30	20	14	8,347
xDemand	.....	6,200	582	214	38	38	16	9	6	7,103
oFire	.....	.....	.....	.....	.....	.....	.....	.....	.....	16,715
Fixed—Reservoirs and Supply Lines	.....	.....	.....							
Output and Demand	50,590	8,990	2,470	2,710	1,175	2,560	4,510	5,380	7,545	35,340
–Output	.....	4,495	1,370	1,690	840	1,830	3,220	3,850	5,380	22,675
xDemand	.....	4,495	1,100	1,020	335	730	1,290	1,530	2,165	12,665
oFire	.....	.....	.....	.....	.....	.....	.....	.....	.....	15,250
Fixed—Pumping and Filters	.....									
Output and Demand	57,130	13,065	3,600	3,950	1,705	3,725	6,570	7,830	10,972	51,417
–Output		9,320	2,400	2,820	1,310	3,100	5,480	6,530	9,140	40,100
xDemand		3,745	1,200	1,130	395	625	1,090	1,300	1,832	11,317
oFire	.....	.....	.....	.....	.....	.....	.....	.....	.....	5,713
xBilling, Collecting, Etc	14,920	12,590	1,365	617	120	121	52	32	23	14,920
–Operating Expense	116,400	29,550	8,150	8,930	3,860	8,430	14,880	17,720	24,880	116,400
Totals:—										
oFire	37,678	.....	.....	.....	.....	.....	.....	.....	.....	.....
xService	71,622	48,327	4,509	4,221	1,203	2,016	2,870	3,484	4,992	71,622
–Output	191,322	51,963	12,827	14,621	6,249	13,686	23,817	28,300	39,859	191,322
	$300,622	$100,290	$17,336	$18,842	$7,452	$15,702	$26,687	$31,784	$44,851	$262,944
Average Price per M. Gals		24.2c	15.2c	15.1c	13.8c	13.3c	12.8c	12.8c	12.8c	16 1c
Service		$6.18	$5.33	$11.00	$16.30	$26.90	$90.00	$174.00	$356.00	$7.73
Output		.126	.113	.117	.116	.116	.115	.114	.114	.118
Final Rate Adopted:										
Service		$6.00	$8.00	$10.00	$13.00	$20.00	$50.00	$100.00	$200.00	$7.17
Straight Output Charge of		.12	.12	.12	.12	.12	.12	.12	.12	.12

Beauty and Efficiency

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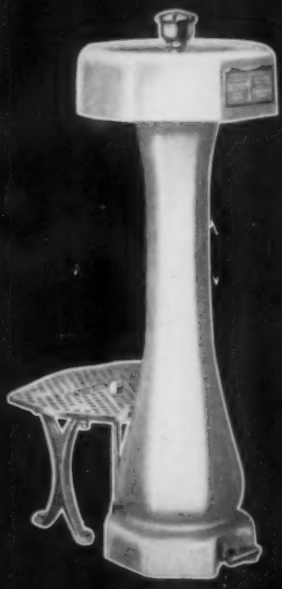
KING WHITE WAY POSTS

SMALL WATER COMPANY—3,500 POPULATION—APPORTIONMENT OF CHARGES

Meter Sizes		⅝"	¾"	1"	1¼" & 1½"	2"	4"	Total
Number of Consumers and Meters	.....	626	4	9	3	3	1	645
Annual Consumption—Gals	.....	14,553,600	508,700	7,194,400	1,957,600	5,887,300	6,871,600	36,973,200
Average Consumption per Meter—Gals	.....	23,250	127,200	800,000	652,500	2,943,600	6,871,600	57,300
Fixed Charges on Meters, Etc	$1,829	$1,711	$17	$36	$23	$17	$25	$1,829
Ratios—Output 19, Demand 100, Fire 0	.....	116/705	580/1200	1700/2050	11/35	55/76	20/40	19/100
-Distribution to Output	.....	282	$8	$30	$7	$12	$13	$352
xDistribution to Demand	.....	1,429	9	6	16	5	12	1,477
xRepairs to Meters, etc. (Dem)	328	307	3	6	4	3	5	328
Fixed Charge on Gridiron	5,363							
Output and Demand	.....	2,705	17	40	13	9	4	2,788
-Output	.....	1,240	10	27	8	6	2	1,473
xDemand	.....	1,285	7	13	5	3	2	1,315
oFire	.....	.....	.....	.....	.....	.....	.....	2,575
Fixed—on Stand-Pipe, Force and Carrying	3,850							
Output and Demand	.....	1,062	37	523	143	428	502	2,695
-Output	.....	483	19	291	89	285	358	1,525
xDemand	.....	579	18	232	54	143	144	1,170
oFire	.....	.....	.....	.....	.....	.....	.....	1,155
Fixed—on Pumping Plant and Filters	8,839							
Output and Demand	.....	2,608	92	1,290	351	1,057	1,232	6,630
-Output	.....	1,630	58	862	234	755	880	6,630
xDemand	.....	978	34	428	117	302	352	4,419
oFire	.....	.....	.....	.....	.....	.....	.....	2,211
								2,210
xBilling, Collecting, Etc	2,047	1,986	13	29	10	6	3	2,047
xAdministration, Etc	3,000	1,763	35	399	112	319	372	3,000
-Operating Expenses	9,939	3,905	137	1,935	527	1,585	1,850	9,939
oFire	5,940	.....	.....	.....	.....	.....	.....	5,940
xDemand Service	11,548	8,327	119	1,113	318	781	890	11,548
-Output	17,708	7,720	232	3,145	865	2,643	3,103	17,708
	$35,196	$16,047	$351	$4,258	$1,183	$3,424	$3,993	$35,196
Average Cost per M. Gallons	.....	$1.10	$.69	$.59	$.60	$.58	$.58	$.95
Service Charge	.....	$13.30	29.80	123.80	106.00	390.00	890.00	17.90
Output	.....	.53	.46	.44	.44	.45	.45	.48
Final Rate—4000 per Q. @ 55c, all over @ 45c + Serv. Charge of	.....	15.00	35.00	125.00	200.00	360.00	600.00	.....



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And these safeguards must be practically "fool-proof"—and built to stand continuous service.

MUELLER SANITARY DRINKING FOUNTAINS

meet all these requirements. They are absolutely sanitary and practically indestructible. They comply with the various sanitary laws.

No. E-3632 here shown is one of many MUELLER models—each made to meet some specific need—and all fully warranted.

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Mueller Metals Co., Port Huron, Mich., Makers of "Red Tip" Brass Rod; Brass and Copper Tubing; Forgings and Castings in Brass, Bronze and Aluminum; Die Castings in White Metal and Aluminum; also Screw Machined Products.

vestment in an "average" meter and in the actual meter in use (which is large enough to supply the maximum demand) will be proportional to the demands in each case. The cost of repairs to meters probably bears a close relationship to the investment in meters, and this cost is distributed between the classes of meters in proportion to the investment.

A fair basis for distributing the costs of the gridiron system is next sought. It is believed that the fairest basis is that found by assigning the costs directly on the basis of the total number of consumers. A more or less arbitrary distinction must be made between carrying mains and gridiron system, the former representing in this discussion the large arteries emanating from the plant, which carry water out to distant districts and to which the smaller mains connect to distribute the water to the consumers themselves.

The size of the gridiron lines is largely dictated by friction loss considerations, it being necessary for the lines to be large enough to furnish fire streams without undue pressure loss. The mileage in these mains has little reference to actual or relative consumptions, but they are made necessary by the fact that the population lives in homes that are scattered over a wide area, and by whose properties water lines must be laid in order to render service. The investment in these lines varies more nearly with the population than with consumption, as such, and it seems fair then to consider that the investment in gridiron system is the same for each consumer. That it probably does not vary with consumption directly, might be seen if it were assumed that in a given plant one large industrial consumer, located near the plant, used as much water as all the remaining population, yet this fact would make little difference in the mileage of mains; they would be required in any event in order to supply the remaining consumers. Any increase in consumers involving building up of new territory would require proportionally greater mileage.

In the distribution of this burden the fire protection charge would ordinarily take the largest share of the cost, and the distribution of the remaining costs between "output" and "demand" would be made with reference to actually observed demands on various parts of the system where records were available. The further distribution as between individual classes of consumers would have to be a question of judgment, but the limits would probably be fairly well defined. The tabulation on the preceding pages, in which a complete example is worked out, will explain the method in greater detail. The ratios for each division, having been obtained by observation of actual conditions for this plant, are distributed to the different classes of consumers by methods similar to that for meters.

The consumptions of the various classes of consumers are probably the best basis upon which to distribute the fixed charges on carrying mains, after a figure has been arrived at for charge to fire protection. In a majority of cities the consumption, both large and small, may be distributed at various, widely scattered locations throughout the city. The carrying mains must be large enough to supply these maximum collective demands or consumptions.

Since the quantity of water to be delivered at various controlling areas, not necessarily influenced by distance alone, is the basis for the design of the carrying mains, it would appear that the money that went into its construction would bear a closer relation to the consumption than to any other feature. The ratio between the average daily use and the maximum demand becomes less as the source of supply is approached, and the ratios in the carrying mains are less than in the gridiron.

The consumption basis for the distribution of costs has been used in each of the remaining classes of service, with the exception of "consumer costs," where such items as bookkeeping, billing, reading meters, etc., has been distributed directly in proportion to the total number of consumers, and the result carried into the sum which later forms the "service charge."

Having assembled the "demand" and "output" charges for all consumers on the same sized meters, the average output charge is found by dividing the total output costs by the total annual consumption for that class, and the "service charge" by dividing the corresponding sum by the total number of consumers in that class.

No highway engineer or road official should be without a copy of our latest manual, "Road maintenance with Tarvia." Write our nearest office.

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Although the Road Commissioner never "heads the ticket" on Election Day, there are few public officials charged with duties more vital to the public welfare.

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This company has a corps of trained engineers and chemists who have given years of study to modern road problems. The advice of these men may be had for the asking by anyone interested. If you will write to the nearest office regarding road problems and conditions in your vicinity, the matter will be given prompt attention.

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Boiler Cleaners for Municipal Power-Plants*

By W. F. Schaphorst, M. E.

IN a previous article the writer has stated that the principal losses in municipal steam power-plants occur in the boiler room. It is easier to save money in the boiler room than in the engine room. Volumes are written about engines, and thousands of dollars in premiums have been paid for engines that will develop a given horse-power and save perhaps 5 per cent of the steam ordinarily consumed. Yet, out in the boiler room, and because of sheer neglect, it is costing much more than it should to generate that same steam. Attendants in the boiler room should always be on guard to prevent heat losses up the "waste-basket of the power-plant"—the chimney, as that is where most of the lost heat goes.

Among his other duties the boiler attendant (which means the fireman in the smaller municipal plants) must see to it that the boiler heating surfaces are always kept clean inside and outside. Cleanliness is essential in attaining high efficiency and capacity. Boilers must be taken out of service regularly to be repaired and cleaned. The two principal offenders that will cause huge losses unless kept off the heating surfaces constantly are scale and soot.

Scale Removal

It is authentically reported that in a series of 120 tests by the Illinois Central Railroad 11 per cent greater mileage was obtained from locomotives during the month after freeing the boilers from scale than was obtained during the three months previous to cleaning. This is equivalent to a saving of 11 per cent of the fuel. In similar tests by other concerns, savings range all the way from 8 per cent to 16 per cent. In a series of tests performed by Professor Schmidt of the University of Illinois on locomotive tubes covered with scale in thicknesses varying from zero up to 1/9-inch, it was found that heat losses vary from zero at zero thickness to 16 per cent at a thickness of 1/9-inch. After a thick scale is once formed, added thickness does not make much difference. The important point is—take all of the scale off and take it off frequently.

Periodical scale removal is desirable for other reasons besides economy. Scale is often directly responsible for the overheating and burning out of boiler tubes when operating at heavy loads. At light loads a given thickness of scale may be harmless, the heat being transmitted without trouble. When the boilers are forced, however, the temperature of the boiler shell naturally increases, often to such an extent that the scale adjacent to the shell becomes dry. When dry, scale is a more effective heat insulator than when wet, and as a result there is grave danger of overheating and burning the shell or tubes. It is not uncommon in plants where the scale menace is lightly regarded to retube boilers completely every two or three years. With proper care, tubes should last nearly as long as the boiler itself. It is cheaper to clean old tubes than to buy new ones.

There are thousands of engineers and owners of plants throughout the United States who are still ignorant of the scale problem—who do not even know that their boiler tubes are coated with scale. One manufacturer writes: "In 75 per cent of the reports to us the officials or engineers claim that they have no scale or are using water which does not produce scale. Yet it is a well-known fact that artesian well water is highly impregnated with scale-making properties. In other words, because the water is clear and safe for drinking purposes and shows no muddy deposit, they seem to think that it is free from scale properties. There are thousands of plants where no attention whatever is paid to scale, yet every little while they find it necessary to retube their boilers and they simply put that down to wear and tear." Rain-water, snow-water and distilled water are about the only waters that do not produce a serious amount of scale in boilers.

* Copyright, 1922, by W. F. Schaphorst.

HOLLOWSPUN

Lighting Standards

WEST ALLIS, WISC., has recently put in service an ornamental street lighting installation in which the standards are made strong enough to support the trolley wires. This and other types of Hollowspun reinforced concrete lighting standards are described in Catalog Supplement No. 9.

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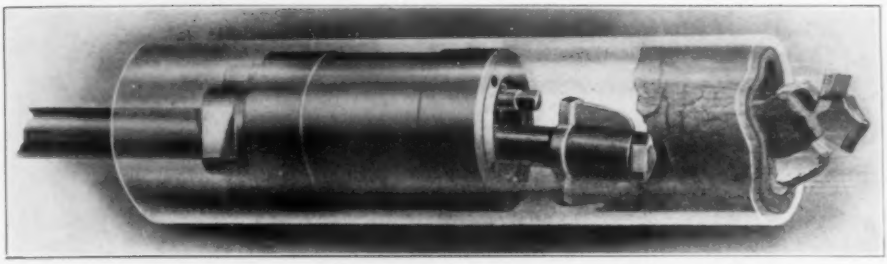
PEOPLES GAS BUILDING CHICAGO



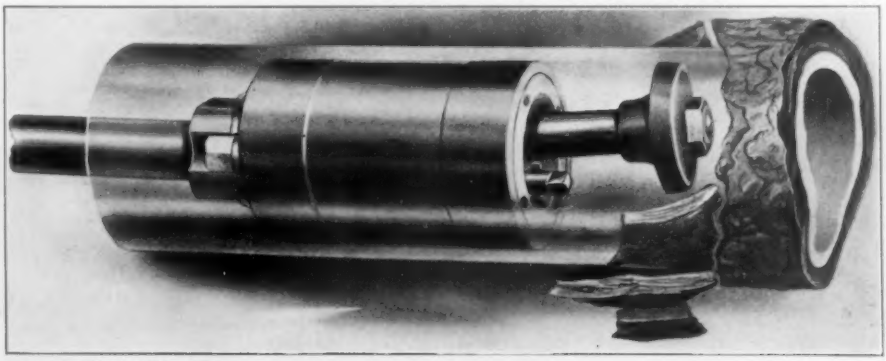
A VIBRATORY SCALE REMOVER OPERATING IN A WATER TUBE BOILER

Some Doubtful Cures

Boiler compounds for the treatment of scale are too frequently used in boilers. Compounds often seem to serve the purpose, but they are unreliable. One can never be certain that all of the scale is loosened, or treated, because of the naturally varying thickness of scale throughout the boiler. The first cost of compounds is usually high, and in addition there is the cost of damage done to the boiler in one way or another. Many compounds contain acids, such as muriatic, tannic, or acetic, and all these acids attack iron. Professor Marks says in his Mechanical Engineers' Handbook: "General corrosion * * * is also caused by the action of certain boiler feed-water compounds containing tannic acid, sulphate of copper, etc. * * * Great caution should be exercised in the use of such materials in boiler practice." If compounds are to be used at all, a good rule to follow is to avoid all secret compounds. They are liable to be bad enough even when the chemical composition is known. Even soda ash, very frequently used and recommended, may be the cause of corrosion, and there is no question that it often causes foaming troubles.

Graphite is also commonly recommended and used for keeping the scale off the heating surface of boilers. The method is to first remove the scale thoroughly and then apply graphite to the heating surface. It is claimed that scale will not adhere readily to the graphite. Then, as long as the boilers are in use, graphite is injected into the boiler so that it will mix with the scale and make it soft and easily crumbled. Preparations using graphite as a base and operating similarly are also on the market. While graphite and kindred preparations do not attack or harm the boiler metal, without the use of mechanical tools the engineer can never be positive that these substances are working effectively. Further, the continual injection of graphite into a boiler and its collective adherence to the shell and tubes may of itself eventually become a menace.

Kerosene and crude oil are also pet "cures" used by some engineers to over-



Courtesy W. P. Pierce Company

VIBRATORY SCALE REMOVER OPERATING IN A FIRE TUBE BOILER

Award of Merit
Presented to Electric & Specialty Supply Co.
by the International Traffic Officer's Association at the Fourth Annual Convention held in Oakland, California, October twenty-fourth to twenty-ninth, inclusive, one thousand nine hundred and twenty-one.
This is to Certify, that the Mushroom traffic light which was exhibited by the Electric & Specialty Supply Co. at the International Traffic Officers' Safety Exhibition, held in Oakland, was carefully examined by the Official Judges of the Exhibition Committee, and that a Diploma of Merit was awarded the above Company.
OFFICIAL JUDGES.

TRAFFIC POLICE APPROVE

Mushroom Traffic Light---Milwaukee Type

has met with the approval of the official judges of the International Traffic Officers Association, who gave the above award of merit for the unqualified supremacy of this traffic guide. This traffic light stands only 8 inches high, is made of cast steel and is equipped with a dual lighting system. When lighted it is a bright spot on the road without glare and, although not large, is big enough to be noticed and respected. These traffic guides are suitable for installation at street crossings on any traffic streets and boulevards.

ELECTRICAL & SPECIALTY SUPPLY CO.

317 So. Jefferson Street, Peoria, Illinois

come scale troubles. These oils are injected directly into the boiler, and in certain cases they are apparently beneficial. Their use should be discouraged, however, because the lighter oils will always distil off, and thick, gum-like greases are left behind, which adhere to the heating surfaces and are, according to some authorities, more effective in retarding heat transfer than is the scale itself. In extreme cases the grease settles to the bottom of the boiler, where it combines with the scale and mud and insulates against heat transfer so effectively that bags or blisters are formed in the boiler shell. Oil and grease should be kept out of boilers just as carefully as scale is kept out. The only thing the fire can do is to heat the boiler shell, making it very hot—sometimes red-hot. If the boiler is under pressure when the shell is red-hot, it is quite natural that the shell should bulge, or "bag," as it is usually called, at the place where it is hottest. Bagging is bad, for it may be the forerunner of a disastrous boiler explosion. Foaming is also sometimes caused by oils because of the minerals they contain. The minerals are liable to be converted into a soapy substance if the feed water is alkaline—also conducive to explosions.

In the United States and Europe, low water is the most common cause of boiler explosions, but carelessness of attendance is also largely responsible. Sometimes experts cannot decide whether an explosion was due to low water or to carelessness, but they all agree that oil and grease are about as much of a boiler menace as is scale and all three should be kept out. They all cause explosions.

It should be borne in mind that after grease once gets into the boiler water it is very difficult to extract. About the only way in which it can be removed perfectly is to distil the water, leaving the grease residue. This method, of course, would be too expensive, and so we must resort to modern mechanical filtering devices. With these devices, when steam first leaves the engine it is whirled through a separator, where most of the grease is extracted by means of centrifugal force and the striking of the grease particles against the separator walls. Then the steam is condensed, and the condensate is forced by pumps through filters of some kind or other, which remove most of the remaining grease The cleansed water then reenters the boiler. To be sure, every trace of oil is not removed. The writer knows of no manufacturer who will guarantee to remove every bit of grease and oil year in and year out. There are successful systems on the market, though, that cleanse the water to the extent that it is no longer harmful.

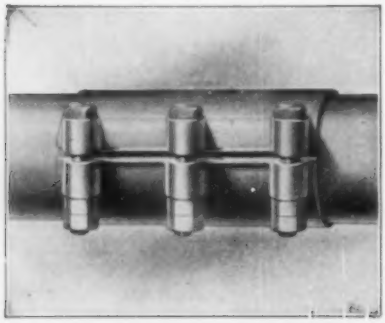
Steam turbines have an important advantage over steam engines in the matter of condensate cleanliness, for the exhaust from turbines is always clean and free from oil. In turbines oil does not commingle with the steam, because lubrication is not required; the blades and other internal parts in the turbine do not rub against other metallic parts—there is no metallic friction.

Even though compounds, graphite, kerosene, etc., assist in loosening the scale, the scale still remains in the boiler. To remove this scale, frequent blowing out of hot boiler water is necessary, and hot boiler water is expensive. Even then, all of the scale is not removed. These scale-removing materials, when doing their best, are therefore only partially effective.

Mechanical Scale Removal

In former years, before the invention of mechanical cleaners, it was necessary to chip out boiler scale by hand, with a hammer and chisel—a very expensive process. As a result, boilers were not cleaned often enough. To-day we have power-driven cleaners operated by steam or compressed air, which do the work quickly, inexpensively, and thoroughly.

There are two types of mechanical cleaners on the market—one rotary and the other vibratory—from which the municipal authority will doubtless make his selection when the time comes to purchase a scale remover. The rotary cleaner contains a number of sharp cutters resembling grindstone dressers, which rotate rapidly on the end of a shaft and are thrust against the scale by centrifugal force. These cutters virtually bore their way through the tubes. The rotary cleaner is used a great deal and, although not always thorough, it is far superior to the hand method. If the scale is extremely hard, it is difficult to get it all out with the rotary type of cleaner, but the soft, spongy top layer can be easily removed. One more or less serious objec-



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Above we show a pipe coupling—a most commonplace detail of construction. But observe that it is designed and built so that it is practically unbreakable. This detail only serves to illustrate the principle upon which all MEDART apparatus is built. It must be so—the lives of children may depend on the strength of the apparatus.

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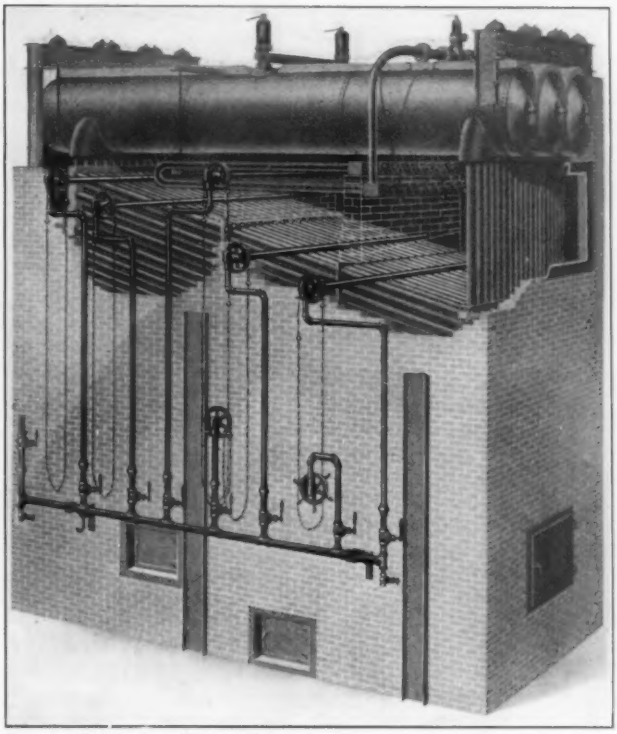
tion to the turbine type of cleaner is the rapidity of wear of the cutter heads and the high cost of replacements.

The vibratory method is usually more thorough, as it does not leave a thin, hard layer next to the metal. The vibrator will usually remove more scale from tubes that have just been turbined. Wear on the vibrator is insignificant, and this type is therefore more durable; the upkeep cost is less.

The vibratory cleaner should not strike the tube too hard, but provision should be made for absorbing the shock. This type of cleaner is usually operated on the principle of the steam engine and is driven either by compressed air or by steam at varying pressures. The pressure to be used depends upon the character of work to be done. The vibrator is moved back and forth at rates ranging from 3,500 to 10,000 times per minute. This rapid tapping of the vibrator sets up corresponding vibrations in the elastic steel tube, which alternately elongates and flattens, in section. Scale is not elastic and cannot bend and vibrate in unison with the steel tube, hence it is quickly loosened. Ten to thirty tubes may be cleaned per hour, depending upon the character and thickness of the scale. This principle of cleaning may be successfully applied to cleaning all kinds of water-tube boilers, straight or curved tubes, condenser tubes, evaporator tubes, and superheater tubes.

The vibratory cleaner has another advantage when applied to water-tube boilers, in that while removing scale from the inside of the tube it simultaneously shakes the soot off the outside. This is particularly valuable where the soot is exceedingly hard.



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The principal reason why soot is so uneconomical is that it gets in between the fire or hot gases and the boiler shell or flue. That is the very position in which there should be no insulating medium at all, because that is where an insulator can create the greatest fuel loss. It has been shown in carefully conducted tests that an insulator between water and metal is not so effective as between gas and metal. Hence, a given thickness of soot on the outside causes far greater loss than an equal thick-

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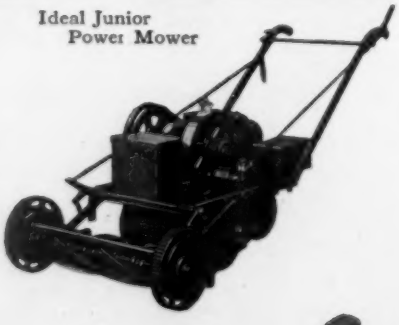

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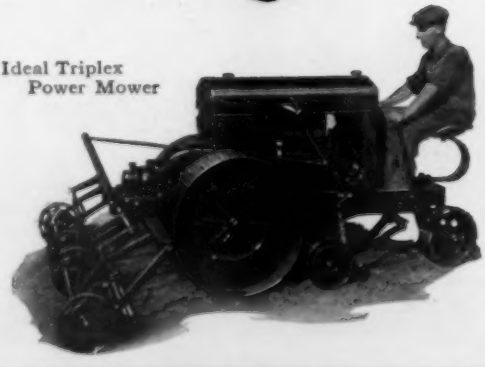

ness of scale inside a boiler. Soot shuts off heat at the very source. It does not permit the heat to even touch the metal of the boiler.

Soot is not only a creator of inefficiency, but at the same time a reducer of boiler capacity. By keeping soot off boiler and flue surfaces, a boiler can be "forced" with better effect than where soot is permitted to accumulate. This can easily be proved by taking temperature readings of the flue gases. Tests have proved time and again that where soot is consistently cleaned off in a thorough manner, the average flue gas temperature is materially reduced. Boiler efficiency can be estimated with surprising accuracy by merely taking the flue gas temperature.

Relationship of Soot and Scale

Not many engineers realize or give thought to the fact that there is a relationship between soot and scale. One is a sort of complement of the other. Where one of them is to be found, the other is more or less lacking. For example, engineers sometimes wonder why it is that thicker scale is to be found on boiler tubes close to the outside wall than close to the inside wall. The reason, which is easily explained, emphasizes the importance of thorough mechanical boiler cleaning in preference to cleaning by hand.

It is plain to anyone that the tube that absorbs the most heat will evaporate the most water, and therefore will leave the most scale to cling to and impair the heat-transmitting qualities of the tube; hence the thicker scale on one side of the tube bank than on the other. On examining these boilers it is invariably found that by the hand method the soot is blown off the tubes through the dusting doors at the sides of the setting. A hand lance thrust through the dusting doors does not clean the far side of the boiler. Instead of cleaning the tubes on the far side, it blows the soot from the near side over onto the tubes farther away and makes matters worse there than before. In some cases it has been found that tubes have been packed completely full of soot and they might just as well not have been in the boiler at all.

By using mechanical cleaners rather than the hand lance, an average saving of about 5 per cent of the annual fuel bill is effected. One reason for this is that with mechanical cleaners it is possible to remove the soot three or four times every day.

In too many municipal plants the old hand lance method of cleaning is still used. The hand method is inferior in many ways and should not be continued. Take, for instance, the matter of velocity of steam. It is practically impossible for the hand lance to give a sufficiently high steam velocity, because of the great internal friction of the lance and the connecting steam hose. High velocity is essential for thorough cleaning.

In practice it has been found that high-velocity steam jets will often clean tubes without even touching them, because of their "injector action." They set up high-velocity air or furnace-gas currents. These currents of gas scrub the boiler tubes and clean off the soot.

Hand cleaning is undesirable also because the boiler must be opened while cleaning, permitting cold air to rush in and cool the boiler-heating surfaces. Some types of boilers cannot be cleaned by hand at all while in operation, but must first be shut down. To shut down a boiler is expensive.

How can we tell when a boiler needs cleaning, internally, externally, or both? By keeping a weather eye on the chimney gas temperature. The lower the temperature, the better. High temperatures should not be permitted. Just as soon as a certain high temperature is reached, that is the time when the boiler should be cleaned.

One engineer made it a practice to clean his tubes as soon as the chimney temperature reached 550 degrees. He found that by so doing he cleaned the tubes an average of three times in 24 hours, so he decided to make it a rule to clean the boilers every 8 hours, regardless of chimney temperature. Another engineer, under different conditions, found that it was best to clean his boilers at a temperature of 575 degrees. He very likely had a dirtier coal, because the temperature rose quickly again and he found that on an average he had to clean his tubes four times per day of 24 hours.

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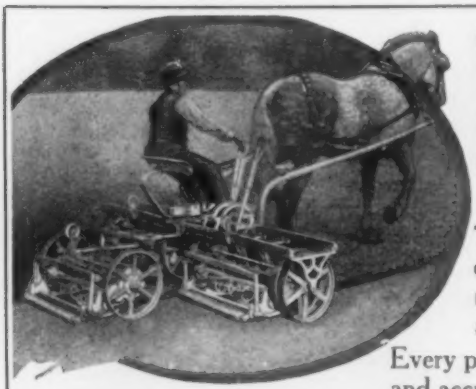

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Increasing the Flow from Drilled Wells

Methods Used in Shooting Oil Wells Now Applied to Deep-Well Water-Supplies

WHERE blasting is possible in the outlying districts of a city or in readily defined well fields, the use of dynamite cartridges in increasing the flow from drilled wells has become quite common practice. A very careful study must be made of the quantity of water in the earth or rocks surrounding the bore hole, the character of the formation, and the rainfall. Most of these data may be secured from the United States Geological Survey and the Weather Bureau. Firing the blast at the bottom of a well in sand or gravel has practically no effect on the flow of the well, for after the explosion the sand or gravel simply settles back into its original place in the porous mass. If sunk in water-bearing rock, the well may draw only from the particular pores and crevices which it intersects. By shattering a larger area with a heavy charge, the sectional area as a whole is increased and radiating fissures created through which the water may flow from a considerable area.

In shooting a drilled well, the explosive should be placed at the maximum water-bearing area to secure the best effects. A quick, powerful explosive and a heavy charge should be used. Either solidified nitroglycerin or 60 per cent straight dynamite is the best, providing the column of water which may be standing in the well is not over 200 feet high. The exact size of the charge is governed by the depth of the well, the nature of the rock to be blasted and the proximity of buildings. For a well 100 feet deep, an efficient and safe charge would be from 100 to 200 pounds of solidified nitroglycerin or from 150 to 300 pounds of 60 per cent straight dynamite. For each additional hundred feet, this loading could be increased by about 100 pounds.

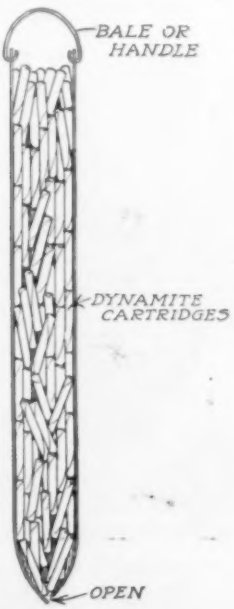

FIG. 1

FIG. 2

The cartridges are packed in a cylindrical shell from 3 to 5 feet in length, made from tin or galvanized iron brought out to a point at the lower end, as shown in Figure 1, to prevent it from catching in its descent down the hole. If there is standing water in the hole, an opening should be made in the lower end of the shell so that the water may pass through and equalize the pressure on the explosives. When the shell is loaded, the bail is placed over a special hook, shown in Figure 2, on the end of a stout line, and the shell is slowly lowered down the hole. Then the hook is freed and drawn up.

In exploding the charge, either a jack-squib, as shown in Figure 3, or an electric squib, as shown in Figure 4, may be used.

The jack-squib consists of galvanized pipe about 2 inches in diameter and 36 inches in length, pointed at the lower end, which is filled as follows: Sand is poured into the pipe to a depth of about 6 inches, a cartridge of 60 per cent straight dynamite primed with two No. 8 blasting caps and two fuses is seated on the sand, and more sand is poured in until it fills the space around the cartridge and covers it to within 4 inches

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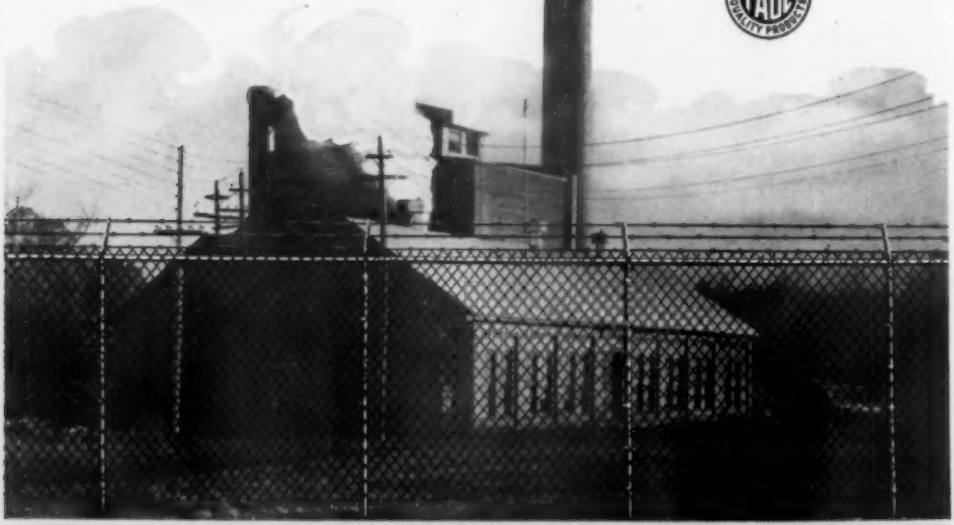


PAGE PROTECTION FENCE

FIG 3

from the top of the pipe. This remaining space is then filled with thick tar. As soon as the squib is prepared, both fuses are lighted, two being used in case one should fail. The squib is dropped into the hole, point down. The length of the fuse should be so calculated that it will explode about the time it strikes the charge and so detonate it.

The electric squib is similar in construction to the jack-squib, but shorter and larger in diameter, with a less sharply pointed end. It is usually about 5 inches in diameter and 20 inches long. It is filled to a depth of about 6 inches with sand, and then a priming charge consisting of one to two cartridges of 60 per cent straight dynamite is placed in the sand, one of the cartridges being previously primed with a No. 8 submarine electric blasting cap. To the wires of this cap, at a point which will come well within the squib shell, are spliced No. 14-gage copper wires long enough to reach to the bottom of the hole, and the splices are well taped. The remaining space is filled with sand topped with a layer of tar. This squib is carefully lowered by the wires until it rests upon the charge, and is then fired by means of an electric blasting machine.

If the well has struck water, there will probably be some standing water in the hole. Every foot of water in the hole exerts a pressure of 43.4 pounds per square inch. Consequently, a column of water 100 feet high over a charge of explosives exerts a pressure of 43.4 pounds on every square inch of the area of the charge. It is this pressure that makes it necessary to protect the detonator from moisture by placing it in the sand-filled and tar-sealed metal shell. As the pressure may tend to force out the nitroglycerin from the cartridges, it is important to fire the shot as quickly as possible after loading. All preliminary precautions, such as removing objects within danger and notifying people, should be completed before the explosive is lowered into the hole, so that no time need be lost thereafter.

Most drilled wells contain a casing throughout a part or the whole of their depth. Exploding a heavy charge at the bottom of the well is likely to damage this casing, either blowing it out in fragments which may do harm if allowed to fly into the air, or causing it to collapse within the bore hole, or splitting it longitudinally along the seam. To prevent the casing from flying into the air, it is well to build a heavy grill-work over the mouth of the hole. This should be securely anchored to the ground. It is hardly possible to prevent splitting the casing, but this is not necessarily a serious result, for a casing that is merely split can easily be pulled out and replaced.

If the casing collapses, however, it is more difficult to remove. In a well 300 or 400 feet deep there is less likelihood that the casing will be blown out or split than in a shallower well, but there is danger of collapse whatever the depth of the well. To prevent the casing from collapsing, the hole should be either full of water to the top or empty of water for 50 feet below the bottom of the casing. This last would mean that the hole was cased through only a part of its length and the explosive charge seated at least 50 feet below the casing.

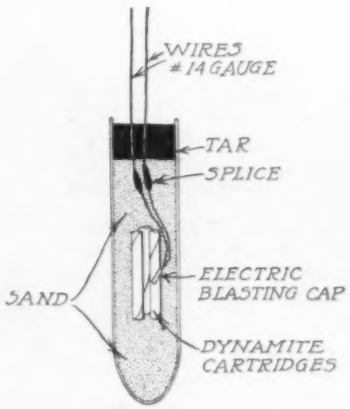
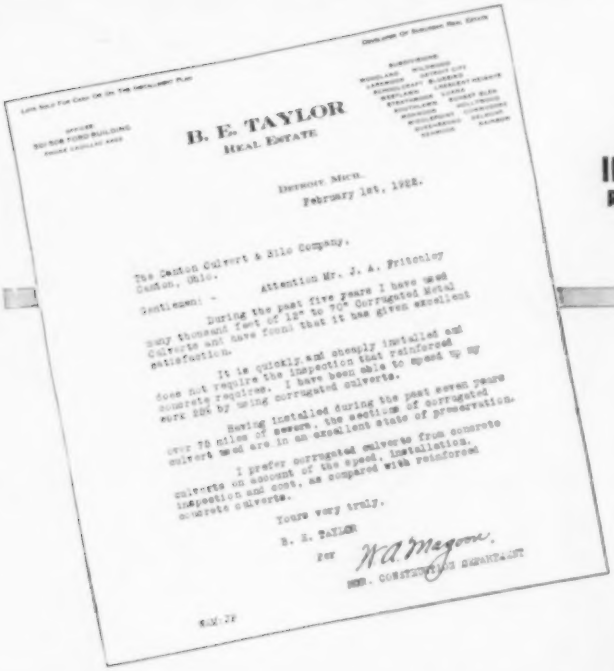


FIG. 4



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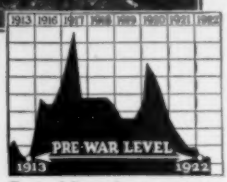

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The City's Legal Rights and Duties

Information for City Attorneys and Other Municipal Officers, Summarizing Important Court Decisions and Legislation

Conducted by A. L. H. Street, Attorney at Law

Has a City the Right to Engage in the Sale of Foodstuffs?

THE decision of the Missouri Supreme Court in the case of State ex rel. Kansas City v. Orear, 210 Southwestern Reporter, 392, seems to be the latest reported decision of a court of last resort having a bearing on this subject; that case having been decided March 15, 1919. And the report of that case has the earmarks of referring to all previous precedents.

The view of the Missouri Supreme Court, which appears to be supported by the weight of judicial authority in other jurisdictions, may be thus summed up: A city may not engage in the sale of commodities unless authorized by its charter. And the legislature cannot confer charter authority unless the constitution of the state clearly permits it. Any exception to this rule must rest on a compelling necessity of the inhabitants of the city.

Holding that Kansas City was not empowered to establish a municipal ice plant, without modification of its charter and the Missouri constitution, the Court said, in part:

"Ice has but recently been elevated—granting for argument's sake the promotion—to a place among the necessities of life. . . . But be this as it may, it is yet certainly no greater a necessity to the human race than are food and clothing. If a city should undertake, absent compelling necessity at least, to establish and operate grocery stores and clothing 'emporiums,' no one would hesitate to say that no power exists in the municipality to use public money, or the proceeds of public taxation, for such purposes. Such things may be given away by the city to paupers and to the temporarily unfortunate, but the city cannot enter into the business of selling such articles to all inhabitants of such city who may desire to buy. If the cities, towns and villages of the state deem that their entry into private business in competition with individuals now engaged in such business is a matter of public expediency, then the initial effort to this end must be an amendment to the constitution; and following such an amendment, the passage of an act changing the common law, which, even without the aid of the constitutional inhibition, forbids the levying and collecting of taxes for any private purpose or business. . . . If the situation were one of continuing or perennial necessity, a city might well have the power under the general welfare clause of its charter to take such steps as would be requisite to supply the compelling need for any such necessity of life so long as such condition existed."

We note that at the recently adjourned session of the Connecticut Legislature authority was enacted for the establishment of municipal ice plants; thereby indicating an understanding in that state that special charter authority is a prerequisite, as declared by the Missouri Court.

Previous court decisions bearing on the subject are reviewed in the opinion of the Missouri Court. It is noted that the Georgia Supreme Court upheld the right of a city to establish an ice plant (68 S. E. 472, 31 L. R. A. (N. S.) 116, 20 Ann. Cas. 199, 134 Ga. 560), but it was observed that the Georgia Court merely decided that such use of the public funds did not impinge upon the constitutional guaranty of "protection to person and property" and against deprivation of property without due process of law. It seems that the Georgia case was not considered, the Missouri Court holds, in the light of necessity for constitutional authority before public funds can be used in such enterprises. But it is conceded that in a later opinion the Georgia Court sustained the right of another municipality to establish an ice plant on the broad authority of the general welfare clause of its charter (147 Ga. 581, 94 S. E. 1022, Ann. Cas. 1918,

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Newport Culverts will last as long as the road itself and hold up all of the burdens of modern traffic. These culverts are made of 99.875 per cent PURE IRON COPPER ALLOY, with copper content not less than 25 per cent. In addition, each square foot of exposed surface carries not less than 2 ounces of spelter.

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907). On the other hand, it is noted that in an earlier case (101 Ga. 588, 29 S. E. 42) the same Court denied the right of the city of Waycross to engage in the plumbing business, as an incident to operating a water-works system.

Mention is made of the holding by the Maine Supreme Judicial Court that the Legislature might authorize municipalities to establish fuel-yards. (111 Me. 486, 90 Atl. 318, L. R. A. (N. S.) 1143, Ann. Cas. 1916C, 734.) But there is also citation to the Louisiana case where it was decided by the Supreme Court that the Legislature could not validly empower a city to establish an ice plant, in the face of a constitutional provision limiting the taxing power of municipalities to private purposes.

Other cited cases include the decision of the Ohio Supreme Court that the city of Toledo could not use public money to operate a moving picture show (88 Ohio St. 71, 102 N. E. 670, 48 L. R. A. (N. S.) 720, Ann. Cas. 1914D, 949), and the decision of the Virginia Supreme Court of Appeals that a city could not maintain a stone quarry without charter authority—not as a mere incident of keeping its streets in repair. (113 Va. 199, 73 S. E. 571, 38 L. R. A. (N. S.) 281.) Reference is also made to the following observations made by the Massachusetts Supreme Judicial Court on a question as to whether the Legislature might validly empower cities and towns to buy and sell fuel:

"Cities and towns now have ample power to provide in any reasonable way for paupers, whether it be by furnishing out-of-door relief, or by support in almshouses, and whether their need of relief is permanent or caused by a temporary condition. It is equally true that the second of these consequences does not justify taxation of those who do not have occasion to buy coal for the benefit of those who do. The use of the money of taxpayers for such a purpose would not be a public use, but a use for the special pecuniary benefit of those who happen to be affected by the state of the coal market." (182 Mass. 609, 66 N. E. 26, 60 L. R. A. 594.)

The Missouri Court also cites other cases bearing on the "discussion from the point of view that municipal corporations may not engage in private business, or use public money in business ventures heretofore deemed to be private." The decision was not unanimous, however, one of the judges —Mr. Justice Woodson—taking the position that the police power of cities to provide for the public health of their inhabitants was sufficient to justify establishment of ice plants. Unfortunately, his opinion is deprived of considerable force through the circumstances that it cites no judicial precedent in support of itself.

An editorial note at pages 104, 105, Annotated Cases, 1918B, summarizes the conclusions of adjudicated cases as follows:

"First, it is beyond the power of a municipal corporation to engage in the sale of commodities which are and can be easily conducted by private business concerns in competition with one another, and which can be sufficiently regulated thereby."

"Second, the sale of fuel falls within the class of commodities mentioned, and there is no necessity why cities and towns should undertake this form of business any more than many others which have always been conducted by private enterprises."

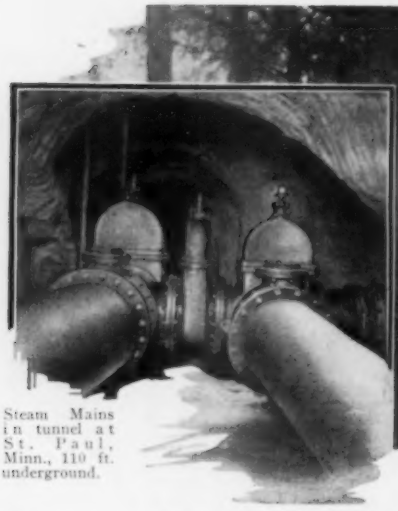
"Third, in regard to 'a condition in which the supply of fuel would be so small, and the difficulty of obtaining it so great, that persons desiring to purchase it would be unable to supply themselves through private enterprises, it is conceivable that agencies of government might be able to obtain fuel when citizens generally could not.' Under such circumstances, the municipality may constitute itself an agent for the relief of the community."

The Danger to the Privileged Party of a Cancellation Option in a Contract

That arbitrary power to determine a contract on short notice may affect its validity and prevent recovery for a breach of it, is shown by the opinion of the Georgia Supreme Court in the case of City of Atlanta vs. National Surety Co., 106 Southeastern Reporter, 179.

Plaintiff city entered into an agreement with a coal company for a supply of fuel during a period of twelve months. Defendant became surety for performance of the agreement. Plaintiff sued for claimed breach on the part of the coal company, but the suit was successfully defended on the ground that there was no mutually binding contract. This defense was based on a clause in the agreement giving the city authorities power arbitrarily to terminate the contract on 48 hours' notice. Applying the fundamental rule of law that mutuality of obligation to carry out a contract is an essential to its validity, the Court says:

"If, independently of the part of the contract quoted, the city agreed to take the coal which the contractor by its bid offered to supply in re-



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Write for complete data regarding cost, operation and profits. *Is there exhaust steam being wasted by any plant in your neighborhood?*

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sponse to the city's advertisement for bids, that portion of the contract just quoted left it entirely optional with the city to take or refuse to take the coal. A contract for the purchase of goods to be delivered in lots throughout a period of 12 months, which gives the purchaser the right at any time to serve notice upon the party contracting to deliver the goods to suspend deliveries, and stipulates that upon giving this notice to suspend deliveries the purchaser will be 'at liberty to refuse to accept' any further deliveries after 48 hours from the date of such written notice, is not a contract binding upon the purchaser. If the purchaser can at pleasure cancel an agreement to purchase, he has incurred no obligation; and to render a contract mutual, the obligation must be upon both parties."

City May Demolish or Remove Unlawfully Constructed Buildings

That municipal authorities may, on notice, lawfully and constitutionally demolish or remove wooden buildings erected in violation of the city's charter and ordinances within the fire limits of a city, is decided by the United States Supreme Court in the San Francisco case of Maguire vs. Reardon, 41 Supreme Court Reporter, 255.

Ordinance Providing for Removal of Limited Quantities of Ashes from Residential Buildings Held Not Unjustly Discriminatory

An ordinance adopted in Baltimore requires the street cleaning department to "remove all ashes from dwelling houses, apartment houses and tenement houses, not exceeding fifteen bushels per week from each, etc." The validity of this measure was disputed in the recent case of Mayor and City Council of Baltimore v. Hampton Court Co., 113 Atlantic Reporter, 850. Upholding the ordinance as against objection that it was unjustly discriminatory against apartment houses producing more than fifteen bushels of ashes a week, the Maryland Court of Appeals says:

The argument in support of the charge of discrimination seems to be based on the theory that the removal of ashes by the city is undertaken as a matter of favor to householders, and on that theory it is contended that either all or none should be removed at public expense, because the work is paid for out of a common fund contributed by taxpayers, and therefore it is unjust to limit the number of bushels of ashes removed from a large apartment house, on which heavy taxes are paid, to that removed from a private dwelling, bearing a much lighter burden of taxation. It is also argued that if 60 families elect to live in one house large enough to accommodate them, it is unreasonable to deny them the right to have all their ashes removed at public expense, while their neighbors who do not live in apartment houses, or in houses large enough to produce more than fifteen bushels of ashes, are relieved of the expense and trouble of providing for the removal of any part of such refuse.

"The answer to both these arguments is that the partial removal of ashes by the city, as provided for in this ordinance, is not undertaken primarily as a matter of favor to individuals or to serve their convenience. If it were, the man who used gas or electricity instead of coal or wood might justly complain that he was being taxed to help pay for services rendered by the city to his neighbor who used ash-producing fuel; and the family living at a hotel might insist that it was being discriminated against.

"As a practical proposition, however, the total amount paid annually by the appellees for the removal of ashes, as shown by the record, is too small when considered in relation to the number of families occupying the apartment to be reflected in the rents paid by the tenants, and it is not believed they are substantially interested in the controversy.

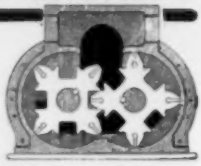
"The only justification for the use of public money at all in an enterprise of this sort is that it serves a public purpose. It is necessary that ashes be removed from time to time to protect the public from the nuisance which their accumulation would occasion, not to the householders as such, but to the public generally using the streets of the city. How this shall be done is for the municipal authorities, and not for the courts, to determine.

"It does not seem to be any more reasonable to require owners of large apartment houses to provide for the removal of their ashes in excess of the amount produced by the owner of large dwellings, than to require hotels, factories and department stores producing large quantities, to remove the same, as we said in Mayor and City Council of Baltimore v. Hampton Court Co. et al., supra, they could be compelled to do."

Requiring Removal of Street Car Tracks on Franchise Expiration

The United States Supreme Court has reaffirmed the rule of law that "where a street railway company, operating in the streets of the city under a franchise granted for a definite period, has enjoyed the full term of the grant, the municipality may, upon failure of renewal of the grant, require the company within a reasonable time to remove its tracks and other property from the streets, without impairing any contractual obligations protected by the Federal Constitution or depriving the street railway company of its property without due process of law." Detroit United Railway vs. City of Detroit, 41 Supreme Court Reporter, 285.)

NORTHERN ROTARY PUMPS



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Wear is automatically adjusted in the Northern so that this contact is maintained constantly for years.

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The Twelve Hour Underwriters Test How Made And Why

The Reo-Northern shown above delivered 308 gallons at 124 pounds pressure for six hours, 159 gallons per minute at 210 pounds pressure for three hours, and 125 gallons per minute at 225 pounds pressure for three hours. *Throttle was not wide open.* Tests made drafting water.

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EPIDEMIOLOGY AND PUBLIC HEALTH—A TEXT AND REFERENCE BOOK FOR PHYSICIANS, MEDICAL STUDENTS AND HEALTH WORKERS. VOLUME I, RESPIRATORY INFECTIONS

By Victor C. Vaughan, M.D., Emeritus Professor of Hygiene, University of Michigan; Henry F. Vaughan, Dr.P.H., Commissioner of Health, Detroit; and George T. Palmer, Dr.P.H., Epidemiologist, Department of Health, Detroit, Mich. C. V. Mosby Company, St. Louis, Mo. 1922. 688 pp. Diagrams and tables. $9.

This is the first of a series of volumes on epidemiology which will undoubtedly be the standard works of this nature for years to come. This first volume covers the entire field of respiratory infections and is based on the broad experience of the author and his collaborators. Professor Victor C. Vaughan says, "In my opinion, the present-day medical man, including the epidemiologist, is not as fully conversant as he should be with the history of epidemic diseases." A complete knowledge of epidemiology is a prime requisite of the health officer and his departmental assistants, particularly in times when terrible epidemics or pandemics are taking the lives of many valuable citizens. This three-volume work should be a guide to health officers in fighting future epidemics. The second and third volumes cover the following subjects: Volume II, Alimentary Infections, Percutaneous Infections, Venereal Infections, Local Infections; Volume III, Public Health, State Medicine, etc.

A HISTORY OF SOCIAL THOUGHT

Emory S. Bogardus, Ph.D., Head of the Department of Sociology and Social Work, University of Southern California. University of Southern California Press, Los Angeles, Calif. 1922. 510 pp. $3.50 postpaid.

This is a history of all the schools of social thought, from the earliest times, with sketches of the ideas of the classic period, of the middle ages, the ideas of Malthus, Comte and Marx. Such chapters as those on eugenics and psycho-sociology and the sociology of modern Christianity bring the subject down to the present.

EVERYDAY CIVICS

Charles Edgar Finch, Director of Junior High School Grades and Citizenship, Rochester, N. Y. American Book Company, New York. 1921. VIII + 326 pp. Illustrated. $1.20.

A text-book for elementary schools, for use either alone or as a supplement to a course in American history. The various features of city, state and Federal Government are simply and clearly presented in a way easily grasped by students.

STANDARDS FOR AMERICAN CITIES

"Attainable Standards in Municipal Programs." Prepared by Howard W. Odum, Ph.D., Professor of Sociology, University of North Carolina. Published as University of North Carolina Extension Bulletin, Vol. I, No. 7. 1921. 130 pp. Illustrated. 60 cents. A partial report of the First Regional Conference of Town and County Administration, held at Chapel Hill, N. C., September, 1921. (Apply to University Extension Division, University of North Carolina, Chapel Hill, N. C.

ESTABLISHMENT AND REGULATION OF OPEN AIR MARKETS

"Suggestions for an Ordinance to Establish, Locate, Regulate and Maintain a Public Farmers' Market and for Other Purposes." Published as Service and Regulatory Announcements (Markets) No. 69, Bureau of Markets and Crop Estimates. 14 pp. 1921. (Apply to Bureau of Markets and Crop Estimates, United States Department of Agriculture, Washington, D. C.)

ZONING IN AKRON, O.

"The Tentative Zoning Plan for Akron." Published by the City Planning Commission, Akron, O. October, 1921. Maps and illustrations. This report explains the purpose of zoning in general and the tentative plans for Akron in particular. (Apply to E. A. Zeisloft, Chief Engineer and Secretary, City Planning Commission, Akron, O.)

TOWN THEORY AND PRACTICE

Edited by C. B. Purdom, author of "The Garden City." Benn Brothers, Ltd., 8 Bouverie Street, London, W. C. 4. 1921. 139 pp. Illustrated. 5 shillings.

This volume is a compilation of papers on various phases of the town planning and garden city movement. Its contributors are W. R. Lethaby, late Professor of Design, Royal College of Art; G. L. Pepler, Past President, Town Planning Institute; Sir Theodore Chambers, Chairman, Welwyn Garden City; R. L. Reiss, Chairman Executive Committee, Garden Cities and Town Planning Association; and Raymond Unwin, author of "Town Planning in Practice."

THE FEDERAL SERVICE

Lewis Mayers, Ph.D., Member of Staff, Institute for Government Research, New York. D. Appleton and Company, New York. 1922. XV + 607 pp. $5.

This is one of the publications of the Institute for Government Research, and is a study of the system of personnel administration of the United States Government. It includes a study of the elimination of politics from the civil service, the problems of selection and recruitment, classification, maintenance of efficiency, working conditions, and the organization of Personnel Administration. Many of the conclusions drawn from this study of the Federal Government are of practical application to the problems of municipalities.

AN UNUSUAL MUNICIPAL REPORT

"Detroit's Government, A Short Story of the Services Rendered During the Year 1921, to the People of the City of Detroit by their City Government." Published by the Council and Mayor of Detroit, February, 1922. 77 pp. The facts usually given in a municipal report presented in an interesting and readable manner. Edited by Henry Steffens, Jr., City Comptroller. Apply to the Detroit Bureau of Governmental Research, Inc., 100 Griswold Street, Detroit, Mich.)

CITY PLANNING IN WATERTOWN, MASS.

"Report on the Proposed Location for Town Hall, Together with Other Changes Suggested in Watertown Square." Prepared for the Planning Board of Watertown, Mass., by John Nolen and Philip W. Foster of Cambridge, Mass. 1921. 14 pp. Map. (Apply to John Nolen, Harvard Square, Cambridge, Mass.)

GAS MASKS FOR FIRE FIGHTING

"Gas Masks for Gases Met in Fire Fighting," by Arno C. Fieldner, Sidney H. Katz and Selwyne P. Kinney. Published by the Bureau of Mines, Department of the Interior, as Technical Paper 248. 1921. 61 pp. Illustrated. 25 cents. This pamphlet includes discussions of the types of gases likely to be encountered by firemen, and the types of masks and breathing apparatus in use. (Apply to the Superintendent of Documents, Government Printing Office, Washington, D. C.)

IOWA STATE FIRE MARSHAL'S REPORT

Eleventh Annual Report of the Iowa State Fire Marshal for the year 1921. (Apply to J. A. Tracy, State Fire Marshal, Des Moines, Ia.)

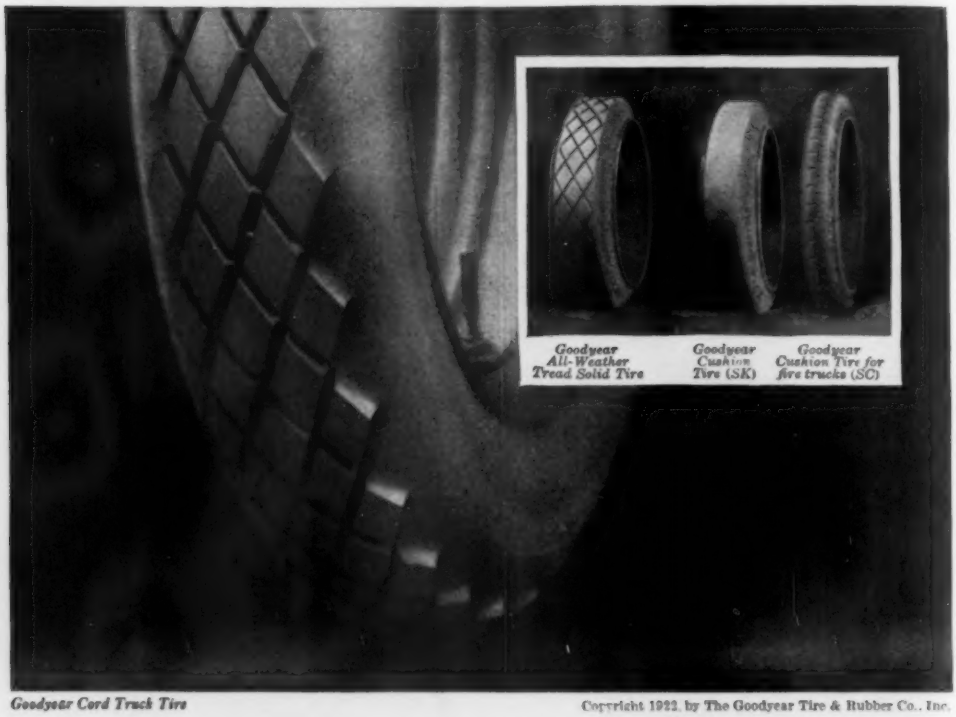
CHILD HEALTH IN NEW YORK CITY

"Infant Mortality in New York City, by Ernst Christopher Meyer, Ph. D., Director of Surveys and Exhibits, The Rockefeller Foundation, International Health Board, New York City. 1921. 135 pp. Charts. A study of the results accomplished by infant-life-saving agencies, 1855-1920. (Apply to author, at the Rockefeller Foundation, 61 Broadway, New York, N. Y.)

SOUND-PROOF CONSTRUCTION

"Sound-Proof Partitions," by F. R. Watson, Professor of Experimental Physics, University of Illinois. Published as Bulletin No. 127, Engineering Experiment Station, University of Illinois, Urbana, Ill. 1922. 85 pp. Illustrated. 45 cents. An investigation of the accoustic properties of various building materials, with practical application. (Apply to publishers, address above.)

GOODYEAR



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WATER-SUPPLIES FOR WARREN, O.

"Report on the Development of the Water Resources of the Mahoning River, Including Stream Control for Sanitary Purposes and for Water Supply," prepared for the Mayor and City Council of the City of Warren, O., by Alexander Potter, Consulting Engineer, of New York. 1921. 148 pp. Maps. (Apply to author, 50 Church Street, New York, N. Y.)

HEALTH DEPARTMENTS OF AMERICAN CITIES

First Report of the Committee on Municipal Health Department Practice of the American Public Health Association. Reprinted from the **American Journal of Public Health**, January and February, 1922. 19 pp. 20 cents. This report was presented at the Fiftieth Annual Meeting of the Association, November, 1921. (Apply to Dr. Louis I. Dublin, American Public Health Association, 370 Seventh Avenue, New York, N. Y.)

RURAL SOCIOLOGY

"Rural Primary Groups," by J. H. Kolb, of the Department of Agricultural Economics of the Agricultural Experiment Station, University of Wisconsin, Madison, Wis. Published as Research Bulletin 51. 1921. 81 pp. Maps. This is a study of rural groups hitherto little recognized or utilized for practical ends. It was carried on cooperatively by the Agricultural Experiment Station of the University of Wisconsin and the Division of Farm Life Studies of the Office of Farm Management and Farm Economics of the United States Department of Agriculture. (Apply to Rural Life Section, Department of Agricultural Economics, University of Wisconsin, Madison, Wis.)

THE BACILLUS WELCHII

"Bacillus Welchii in a Public Water Supply as a Possible Cause of Intestinal Disease," by Herbert B. Larner, S. B., Health Officer, Montclair, N. J. Reprinted from **The Journal of the American Medical Association**, January 28, 1922. 8 pp. (Apply to American Medical Association, 535 North Dearborn Street, Chicago, Ill., or to author.)

CIVIL SERVICE IN ST. PAUL, MINN.

"The Merit System in Saint Paul." The eighth annual report of the Bureau of Civil Service, St. Paul, Minn., for the year 1921. 45 pp. and charts. (Apply to Jesse Foot, Comptroller.)

THE WORK OF THE FOREST PRODUCTS LABORATORY

"The Forest Products Laboratory—A Decennial Record, 1910-1920." Published by the Decennial Committee, Howard F. Weiss, Chairman. 1921. 196 pp. Illustrated. An account of the work done in the institution of industrial research maintained by the Branch of Research, Forest Service, United States Department of Agriculture, at the University of Wisconsin, Madison, Wis. (Apply to Carlile P. Winslow, Director, Forest Products Laboratory, Madison, Wis.)

LEGAL AID IN NEW YORK CITY

"Fort-sixth Annual Report of the President, Treasurer, and Attorney of The Legal Aid Society," for the year 1921. 95 pp. (Apply to Leonard McGee, Attorney-in-Chief, The Legal Aid Society, 239 Broadway, New York, N. Y.)

WEIGHTS AND MEASURES

Report of the Fourteenth Annual Conference on Weights and Measures, held at the Bureau of Standards, Department of Commerce, Washington, D. C., May, 1921. Miscellaneous Publication No. 48. 1922. 132 pp. 20 cents. Verbatim report of the conference. Includes text of model standard-loaf bread law. (Apply to Bureau of Standards, Department of Commerce, Washington, D. C.)

TRACTION PLANS FOR CHICAGO

"Opinion and Report submitted to the Sub-Committee on the Formulation of Traction Plans," by William H. Sexton, Stephen A. Foster and Jerome N. Frank, Counsel for the Committee on Local Transportation, Chicago. 1922. (Apply to Ulysses S. Schwartz, Chairman of the Committee on local Transportation, Chicago, Ill.).

ATLANTA CONVENTION OF FIRE CHIEFS

Proceedings of the Forty-ninth Annual Convention of the International Association of Fire Engineers, Atlanta, Ga., October, 1921. 270 pp. Illustrated. (Apply to the Secretary, James J. Mulcahey, Chief, Fire Department, Yonkers, N. Y.)

ZONING IN SAN FRANCISCO

Building Zone Ordinance of the City and County of San Francisco, approved October 3, 1921, 3 pp. and numerous maps. (Apply to J. S. Dunnigan, City Clerk, San Francisco, Calif.)

THE SERVICE CITIZENS OF DELAWARE

"How the Service Citizens Serves the Citizens of Delaware." Report made to the Board of Managers of the Service Citizens of Delaware, November 18, 1921, by Joseph H. Odell, Director. 26 pp. (Apply to Joseph H. Odell, Director, Service Citizens of Delaware, Public Library, Wilmington, Del.)

BENCH MARKS IN NEW JERSEY

"A List of Bench Marks in New Jersey," revised to 1920, by Loren F. Plummer, Jr. Published as Bulletin No. 21, Geologic Series, of the Reports of the Department of Conservation and Development, Division of Geology and Waters. 116 pp. and map. (Apply to Alfred Gaskill, Director, Board of Conservation and Development, Trenton, N. J.)

A SURVEY OF DUBOIS, PA.

"Know Your Own City," by the Civics Classes of the DuBois, Pa., High School, 1920-21, J. B. Lambert, Instructor. 20 pp. 1921. A survey of the resources and advantages of the city. (Apply to J. B. Lambert, DuBois High School, DuBois, Pa.)

THE FOREST PRESERVES OF COOK COUNTY, ILL.

"The Forest Preserves of Cook County, Ill." Report for the year 1921. 233 pp. Illustrated. (Apply to Board of County Commissioners, Cook County, Chicago, Ill.)

FORESTRY IN OREGON

Eleventh Annual Report of the State Forester, for the year ending December 31, 1921. 29 pp. (Apply to F. A. Elliott, State Forester, Salem, Ore.)

CITY PLANNING IN MEMPHIS, TENN.

First Annual Report, City Planning Commission, Memphis, Tenn. 1921. 42 pp. Maps and illustrations. The report embodies the work accomplished by Memphis during its first year of city planning, under the counsel of Harland Bartholomew. (Apply to C. C. Pashby, Secretary, City Planning Commission.)

PROTESTS AGAINST TAX INCREASES

Two pamphlets published by the Chicago Bureau of Public Efficiency, 315 Plymouth Court, Chicago, Ill.: "A Protest Against the Proposed New County Road Tax," April 1, 1922, 8 pp.; "Suggestions for Avoiding an Unnecessary Increase in School Taxes," April 4, 1922. 6 pp. Both in letter form, the first addressed to the Board of Commissioners of Cook County, the second to the Board of Education of the City of Chicago. (Apply to Harris S. Keeler, Director, Chicago Bureau of Public Efficiency.)

MOSQUITO EXTERMINATION

"Mosquitoes and Mosquito Control." By George W. Simons, Jr., S. B., Chief Sanitary Engineer, Florida State Board of Health, and George F. Moznette, Entomologist, Bureau of Entomology, U. S. Department of Agriculture. Published by the Florida State Board of Health, Jacksonville, Fla. 1922. 36 pp. Illustrated. Describing the appearance and habits of the mosquitoes of Florida which cause dengue fever, yellow fever and malaria, and giving their life history. Explaining in detail effective control measures and showing what every community ought to do to be free from the effect of these pests upon health and prosperity. (Apply to George W. Simons, Jr., Chief Sanitary Engineer, State Board of Health, Jacksonville, Fla.)

BUILDING REGULATIONS

"Limitation of Heights of Buildings," prepared by the City Planning Commission of Akron, O. 1922. 16 pp. Giving the reasons for the Commission's recommendation of the 130-foot limit. (Apply to E. A. Zeisloft, Secretary, City Planning Commission, Akron, O.)

REGIONAL PLANNING

Proceedings of the First Regional Planning Conference of Los Angeles County, California. Held at Pasadena, January 21, 1922. 24 pp. Maps and illustrations. (Apply to G. Gordon Whitnall, Secretary of the Executive Committee, City Hall, Los Angeles, Calif.)

Officers Baker, Ryan and Smith, with their Harley-Davidsons, "keep law and order" at a profit for Sacramento County, Cal.

Two New Records Set by Sacramento County Traffic Squad

In 12 months, Sacramento County, California, received $9,508.50 in fines resulting from arrests made by the three Harley-Davidson-mounted officers of the County Traffic Squad. And Officer Tom Ryan (shown in the center) rode his 1921 Harley-Davidson 21,000 miles at a cost for repairs and tires of only $12.40 per month.

No wonder over 800 cities and counties are using Harley-Davidsons for police work! No extra cost for the taxpayers. Fewer crooks in the vicinity. Less speeding and reckless driving. Increased revenue for the police department. And with all, the most mobile, "ready-for-any-emergency" kind of police protection a community can have—protection which citizens and business houses appreciate.

Ask your local dealer for free demonstration of the 1922 Harley-Davidson. The reduced prices will surprise you, too.

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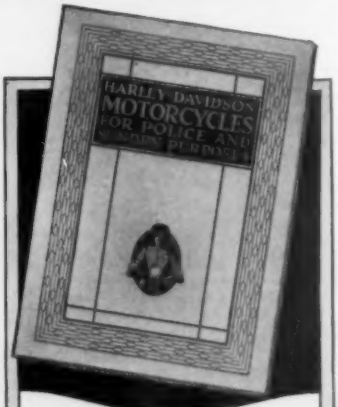

CITY officials and those interested in police department efficiency should have our new book, "Motorcycles for Police and Sundry Purposes." Write on your letterhead for your complimentary copy, and see how other cities are using motorcycles to increase police efficiency.

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Methods, Materials and Appliances

News for City and County Engineers, City Managers, Water-Works Superintendents, City Controllers, Park Superintendents, Purchasing Agents, and Others Interested in the Economical Construction and Efficient Operation of Public Improvement Undertakings

Road Graders and Rollers

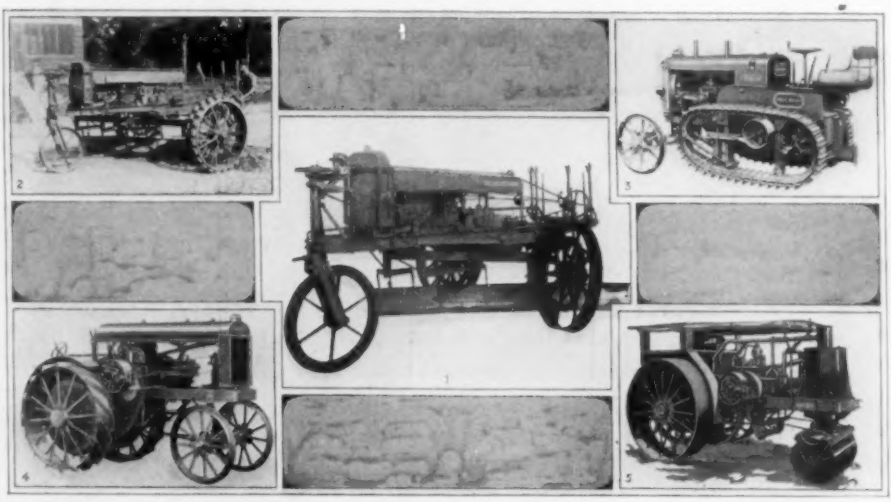
Owing to the demand for smaller size machines than the regulation one-man "Road-Razer" made by the Avery Company, Peoria, Ill., this company has brought out a small size machine for narrow roads and streets. The width of the original Road Razer from drive wheel to drive wheel is 93 inches. It has a three-section blade 12 feet 6 inches long and cuts a 9-foot 6-inch swath. The new model Road Razer is 70 inches wide, has a three-section blade 10 feet 3 inches long, and cuts a 7-foot swath.

For service on gravel, crushed stone, and oiled streets and roads, the regulation machine has been equipped with rubber block tired wheels. This equipment has been used quite successfully in Indiana, Ohio and Michigan, where there are a great many gravel and crushed stone roads. F. E. Burt, Superintendent of Streets of Flint, Mich., reports that with the rubber-tired equipment he has found the machine much more satisfactory for city work, where at times it is necessary to drive over asphalt paving to get to a job; the rubber-tired wheels make it possible to do this without cutting the pavement with the lugs.

The Avery Company has also brought out recently a Track-Runner tractor which has considerable value in the city and county fields. There is one track-runner on each side, each about 6 feet over-all. The tractor weighs about 5,000 pounds complete and can turn practically in its own length.

In addition to the track-runner machine mentioned above, there is a new 12-20 Avery tractor with direct wheel drive and spur gear transmission. The horse-power draw-bar rating is 12 and 20 on the belt. It is run by a 4-cylinder engine with 4½-inch bore and 6-inch stroke operating normally at 800-950 r.p.m. The engine, complete with all equipment, weighs 1,250 pounds. The driving wheels of the built-up type are 52 inches in diameter, with 14-inch face. The turning radius of the machine is 9 feet.

Avery road tractors may be furnished with a road roller attachment, which hooks under the front end of the tractor in place of the front wheel. It is entirely different from any other type of road roller which this company has



VARIOUS ADAPTATIONS OF A TRACTOR UNIT

1. A small-size "Road Razer" for narrow roads and streets. 2. A regulation-size machine equipped with rubber block tired wheels for running over gravel and other similar roads. 3. A track-runner tractor that insures good traction. 4. A tractor with direct wheel drive. 5. An Avery road tractor with road-roller attachment

Good roads all year round

Through the simple addition of Water Tank, Pressure Pump, Spraying Attachment and lighter broom, the FOX ROTARY SNOW BROOM has been successfully converted into a Street Sweeper that will clean perfectly at the rate of 12 miles per hour.

The possession of this machine assures to Municipalities the certainty of clean streets in both winter and summer.

Get detailed information from us and reports from Cities now operating this remarkable machine all year 'round.

Fox Rotary Snow Broom Co.

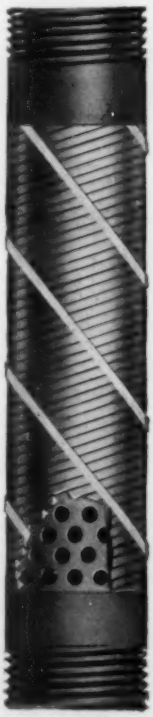
Two Lombardy Street, Newark, N. J.

used and makes it quite easy for road officials to roll the roads with the same machine which they use in building them. It has the same wheel base as the Avery tractor with the front wheel. The tractor will turn around as short with the roller as with the axle. The turntable is mounted on ball bearings, having 75 one-inch hard steel balls which carry the roller. This machine makes it possible for road builders to roll and pack a road as they grade it. The tractor with the roller is 9 feet wide and has an average pressure of 175 pounds to the square inch. This road roller attachment can easily be removed in less than an hour and the wheels put back on the machine for use in hauling and other road jobs.

Well Screens to Protect Pumps

Well screens of two types—all-brass, and pipe base—are manufactured by Edward E. Johnson, Inc., St. Paul, Minn., for use in connection with driven wells ending in sand or gravel, to prevent the entrance of sand into the pumping system.

The all-brass screen is a cylinder made up of the coils of a single strip of brass of special section, the successive coils of which interlock. The brass strip is so shaped that a narrow slit occurs on the outer face of the cylinder between successive coils. The water passes through the slit into an interior annular space, the sides of which diverge sharply from the slit to prevent clogging. The inside or supporting wall is reinforced by brass rods soldered continuously to the inside wall. The screens are made in sections from 2 to 18 feet in length, for setting in pipe from 2 to 16 inches in diameter, and with inlet slots .006 to .06 inch in width. They are adapted for setting in wells by pulling back the casing, washing down or bailing, but not for driving.



BRASS WELL SCREEN

BRASS PIPE BASE WELL SCREEN

The pipe base well screen is designed particularly for conditions which require the driving of the screen ahead of the casing. It consists of an iron pipe, perforated and threaded, the perforated section being covered with a continuous spiral wrapping of Johnson's jacket ribbon soldered to the pipe and having upon it in open spiral a tinned solder strip wound in the opposite direction for reinforcing. The jacket ribbon is made up of parallel strands of triangular brass wire soldered crosswise at regular intervals to maintain the slot openings. These screens are made in sizes to fit in wells from 2 to 18 inches in diameter. The screen can be removed, cleaned and replaced, or a new screen surface applied at the well.

Lighting the Ideal Section of the Lincoln Highway

The necessity for lighting main highways in the open country so impressed the Technical Committee of Highway Engineers and other experts who determined the specifications for the Ideal Section of the Lincoln Highway Association that the problem of ideal illumination was given to the illuminating engineers of the General Electric Company, Schenectady, N. Y., headed by W. D'Arcy Ryan, for solution.

The most advanced type of highway lighting unit that this company has developed will be installed on the Ideal Section this summer. It is simple in design and economical in regard to installation cost and operation as well as maintenance. It embodies a new principle for collecting the light rays and casting them on the roadway instead of on the vacant fields adjacent to the highways. This is accomplished by a nest of reflectors, a series of three, one within another. These reflectors serve to collect the light which would be reflected upward and outward over the adjoining field and to cast it on the surface of the road, at the same time preventing the possibility of glare, the danger and annoyance of which are realized by the motorist. The bracket holding the lamp and the nested reflectors is to be affixed to an ornamental concrete pole 35 feet high. The bracket is adjustable in both horizontal and vertical positions, permitting the illumination of hillsides and curves in the road.

One of these units will be installed every 250 feet along the edge of the paving, alternate lighting standards being on opposite sides of the road. All power wires for lighting will be underground, and the lights will be controlled by an automatic oil time switch, which can be ad-

Tractors
for power, speed, economy

Preparing streets for repaving, breaking up old pavements, making new thoroughfares, all require an abundance of steady, dependable power.

Scarifiers, plows, drills, levelers, scrapers, graders, etc., do their best work, and more of it, when propelled by good tractors. This is because the tractor has the reserve power to keep the tool moving constantly at proper speeds and with proper adjustments for maximum results.

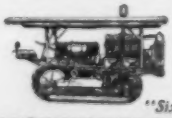
Tractors like the BEST concentrate the pulling power of a large number of animals within a small unit which is easy to manage, easy to maneuver, and which has none of the weaknesses of the flesh.

Best Tractors are famous for stamina, power and dependability, and their cost for up-keep and operation is small. That is why they are being adopted more and more by municipal, county and state officials for road and street making and maintenance.

Let us send you further details on the use of tractors for road and street work. Write for catalogs, prices and names of our nearest dealers.

C. L. BEST TRACTOR CO.
SAN LEANDRO - CALIFORNIA

There are three models of Best Tractors—the "Sixty," the "Thirty" and the "Cruiser" (60). All are factory-built—not assembled.


"Sixty"

"Thirty"

"Cruiser"

LIGHTING A ROAD WITHOUT LIGHTING THE FIELDS

justed to turn them on and off at any determined hour in the evening and the morning.

The cost per unit per year is figured at $23.50, and as there are twenty lighting standards with their units per mile, the cost of lighting the roadway per mile for the necessary hours each night will be only $465, including maintenance and current. This figures to about 25 cents per foot of roadway per year, which is low considering the benefits to be derived, including accident prevention, increased night traffic, thereby relieving day congestion, decreased running time, increased road capacity, additional comfort and pleasure for those driving at night, through relief of eye-strain and the elimination of the necessity of switching dimmers on and off when passing other vehicles.

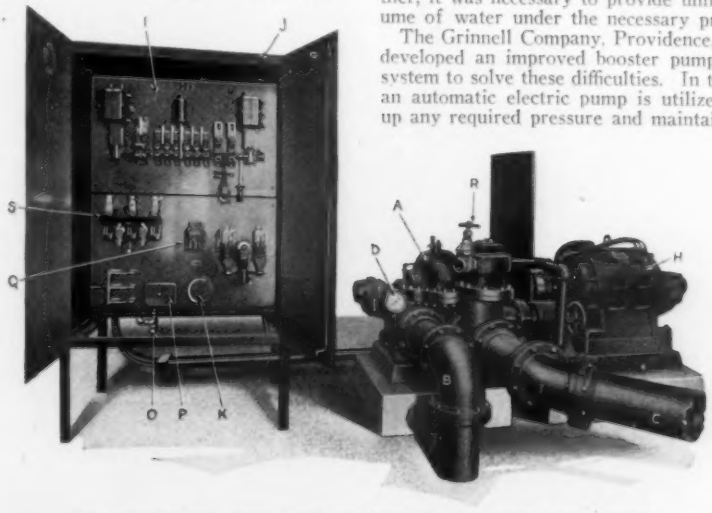
The subsidiary benefits of rural highway lighting must be considered also. Power lines required for rural illumination bring electricity to the farm, increase real estate values, tend to the extension of city building out along the roadways, and discourage automobile hold-ups.

Fire Sprinkler Systems for Low Water Pressure Cities

Low city water pressure has been one of the greatest drawbacks to the more general use of automatic sprinkler systems. Especially has this been so in the greatest congested value districts in the world. In New York, Chicago, Philadelphia and Detroit, city water pressure is inadequate to supply sprinkler system in even moderately high buildings. In cities and towns having low water pressure, there are millions of dollars' worth of combustible business values which have been denied the many benefits of sprinkler protection because of inadequate city water pressure, for two reasons: the impossibility of introducing low-cost single-source sprinkler systems supplied only by city water; and the impracticability of tank-supplied systems, on account of high first cost, due to the expense of tanks and building alterations, and on account of structural weaknesses in the buildings themselves, rendering them incapable of supporting tanks even after extensive alterations.

These factors have combined to make it exceedingly difficult to eliminate frequently recurring individual fires and the danger of sweeping conflagrations in many great congested value districts. The solution of this problem demanded the creation of high water pressure without the use of tanks, and the assurance that whatever pressure was created would be at least as certain as the average city water pressure. Further, it was necessary to provide unlimited volume of water under the necessary pressure.

The Grinnell Company, Providence, R. I., has developed an improved booster pump sprinkler system to solve these difficulties. In this system an automatic electric pump is utilized to build up any required pressure and maintain it. The



AN AUTOMATIC ELECTRICALLY-DRIVEN BOOSTER FIRE PUMP

A. The pump. B. Low-pressure supply pipe. C. High-pressure discharge line. D. Supply-pressure gage. H. Electric motor. I. Combined manual and automatic starter panel. J. Cabinet for starter panel. K. Automatic regulator for pump. O. Test valve. P. Pipe from test valve wasting to sewer. Q. Relay on control board for closing test valve. R. Valves for attaching hose S. Circuit breakers

TRINIDAD in the Nation's Capito'
12th Street, N. W., N to O Streets, Washington, D. C.,
Laid with Trinidad Lake Asphalt in 1881.

Forty-one years of life

under traffic in Washington

Laid in 1881—before the "gasoline buggy" was even heard of—when the women of Washington wore bustles—*and good for many years to come!*

That's the remarkable history of the Trinidad paving on 12th St., N. W., N to O Sts., Washington, D. C.—one of the capitol's many splendid Trinidad streets. For the past years the maintenance cost on this street has been only .0177 cents per square yard per year.

And it's just such unbeatable records—established under the most severe conditions of traffic and weather—that have made Trinidad Lake Asphalt "The Standard Paving Material of the World."

Trinidad Lake Asphalt is a product of the Ages. Centuries of exposure to the rigors of tropic weather have but seasoned and toughened it for long-lasting service on modern highways.

Before repaving that old street or paving a new, let us tell you more about this wonderful material. Write for illustrated folders.

The Genasco Line includes asphaltic roofing, flooring, paints and allied protective products. Write for descriptive matter.

New York
Chicago
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THE BARBER ASPHALT COMPANY
PHILADELPHIA

St. Louis
Kansas City
Atlanta
San Francisco

TRINIDAD LAKE ASPHALT

idea of a booster pump is not new, but certain features have been developed distinguishing this pump from the ordinary automatic equipment.

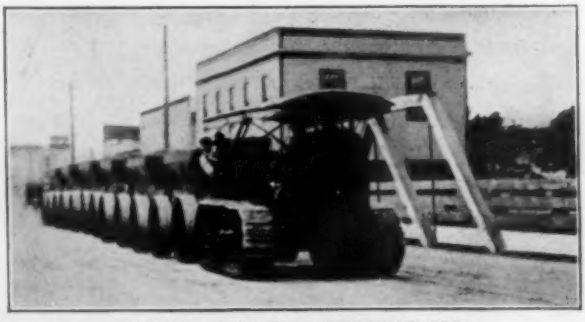
In its elements the new system is practically the same as any single-source sprinkler system supplied by city water, except that the whole pump unit is cut into the system between the city connection and the main riser. The capacity of the pump is determined by the size, construction and contents hazard of the building to be protected. The pump takes suction direct from the city water-mains and builds up the pressure in the sprinkler system to the required amount. It then stops working, but whenever the built-up pressure falls appreciably, the pump automatically starts and works until the full pressure is restored. In the case of fire with a consequent opening of sprinkler heads and reduction of pressure, the pump continues to operate and maintain adequate pressure on the sprinklers up to its full capacity.

BUILDING ROADS IN NORTH CAROLINA

Tractors in Road Building

The tractor is fast taking the place of animal power in road building and road maintenance work. It has proved a big time-saver, not to mention the fact that a tractor can be operated continuously without a rest, with less help, and over ground conditions impossible to negotiate with animal power.

The special advantages claimed for the Best Tracklayer tractor, made by the C. L. Best Tractor Company, San Leandro, Calif., are that it has dependable flexible power, giving the road building contractor, the highway engineer and the supervisor the assurance that the tractor will handle the job at hand without trouble. These tractors are built for heavy-duty service, which necessitates the use of good materials. They are built compactly, are easy to handle and have sufficient reserve power to respond to unusual demands. In the handling of elevating graders, scarifiers, levellers, graders, plows, chisels and other implements used for road construction and maintenance, these tractors have made many good records. One illustration shown herewith gives a good idea of their use in hauling a long line of wide-wheeled trailers loaded with gravel for a highway job. The other depicts one of these machines hauling a blade grader on a road job in North Carolina, easily piling up the dirt from the ditch onto the crown of the road.



HAULING GRAVEL TO HIGHWAY JOB

A Self-propelled Tree Sprayer

With spring here, city foresters and entomologists are turning to getting spring spraying done on all trees that are threatened with moths and other parasites. The Field Force Pump Company, Elmira, N. Y., manufacturer of the "Ospraymo" line of spraying equipment, makes a self-propelled machine of high power with auto truck drive, for municipal departments. This machine is also used by the Bureau of Entomology, U. S. Department of Agriculture.

The complete tank and pumps are mounted on a 3½-ton truck. The engine has ample power to drive the truck and operates the pump at 600 pounds working pressure. It is equipped with a roller-chain drive direct from the main line shaft of the truck engine to the pump. The pump drive is equipped with a jaw clutch controlled from the driver's seat and is of the triplex plunger type, having cylinders of 3¼-inch bore and 4-inch stroke, with 50 gallons per minute capacity at 600 pounds pressure. The tank holds 400 gallons, is made of clear white pine or cypress, and is fastened to the frame by four steel rods passing through the sills and upward through the top ledge of the tank, which has a filling hole of ample size with hinged cover. The pump and gearing are protected by oiled duck side-curtains, forming a tight housing.

The contents of the tank are thoroughly mixed by an agitator driven directly from the pump by a chain belt. The steel shaft and long

WHY TIFFIN FLUSHERS

Superb Construction, Superior Design, Specialized Quality Units, Unity of Service

ECONOMY, EFFICIENCY, DURABILITY, SANITATION

Ask users about Tiffin Flushers and Tiffin Service.
Write us for catalog and engineering detail.

THE TIFFIN WAGON COMPANY, TIFFIN, OHIO

"THE BEST BY EVERY TEST"

72 New Contracts for 1,478,333 Square Yards of Warrenite-Bitulithic Pavement Since January 1

Because

Warrenite-Bitulithic can be laid over any suitable existing base and will give dependable service for longer periods than other types of paving.

Because

Warrenite-Bitulithic has always given the most satisfactory kind of service under the severest use and the hardest climatic conditions.

Because

Warrenite-Bitulithic has been adopted as a standard construction in over 550 cities throughout the United States and Canada.

Our expert supervision and laboratory service insures quality and service without equal.

Let us send you our booklet about Warrenite-Bitulithic.

WARREN BROTHERS COMPANY

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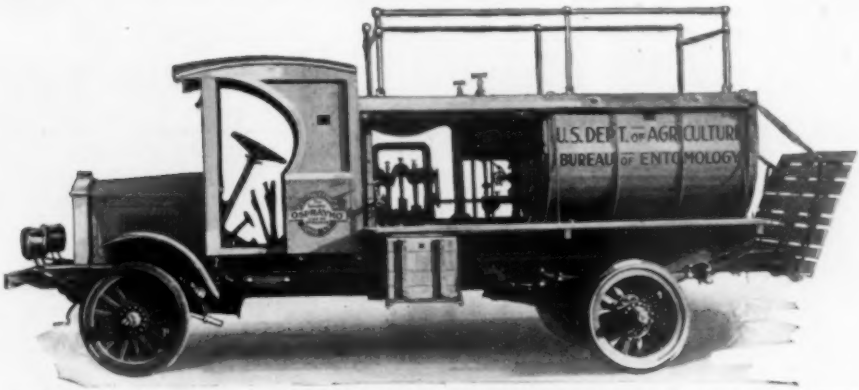


A HIGH-PRESSURE SPRAYER FOR PROTECTING TREES FROM THE RAVAGES OF MOTHS AND OTHER INSECTS

paddles extend the entire length of the tank. The poison-mixing tank is of galvanized iron 16 inches in diameter by 18 inches deep, mounted between the pump and the liquid tank and having the mixing paddles driven from the agitator shaft, so that the mixing is thorough and continuous. Two hydraulic pressure gages, registering 1,000 pounds, and two safety release valves are included, so that the liquid may flow back into the large solution tank when the nozzles on delivery lines are closed. Running boards are placed on both sides of the machine, and a stout railing of gas pipe on top of the tank affords protection and safety for the crew.

These machines are built from specifications furnished by the United States Department of Agriculture and are carefully built and worked out for spraying large, tall trees in forests or parks for protection from the gypsy moth, elm leaf beetle, tussock moth and other pests of woods and farms.

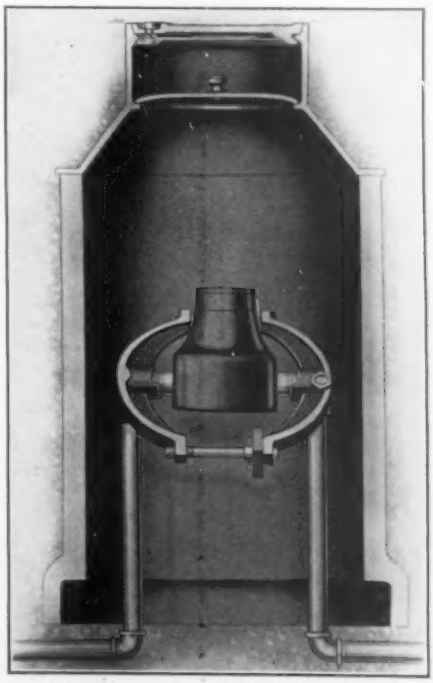
Municipal Development Engineer

Jacob L. Crane, Jr., has opened an office at 1002 Wrigley Building, 400 North Michigan Avenue, Chicago, Ill., for the practice of municipal engineering and town planning. Mr. Crane has been engaged in this work for some years and spent six months in 1921 collecting city planning data in Europe. He is technical advisor on zoning and city planning in Chicago for the Chicago Real Estate Board.

A New Meter Yoke

The Ford Meter Box Company, 406 South Carroll Street, Wabash, Ind., has recently brought out a new meter-holding yoke to be used in connection with meter boxes. This "Meter Grip" is designed to meet the demand for a cheap and effective meter-holding yoke.

The yoke is designed to be sold at a lower price than regular yokes, but is made of the best material, selected to stand years of use in damp locations. It is made for meters of ⅝- and ¾-inch sizes and may be used with meter-box covers of any type, either single or double lid. The yoke is made plain or with a stop valve on the inlet end, and either plain or with a test valve on the outlet end. Valve-ended types are supplied with bronze-lined stops, and where these are used, the usual curb stop and curb box may be dispensed with.



A COMPLETE UNIT—BOX, YOKE AND METER

The Truth About Drinking Fountains

UNSAFE

No. 1. Vertical stream which permits saliva and waste water from the drinker's mouth to fall back to source of supply. No longer considered sanitary.

UNSAFE

No. 2. Modification of vertical stream. This slight angle is little if any improvement over No. 1.

IMPRACTICAL

No. 3. More sanitary if properly used. However, stream is hose-like with no definite drinking point. Difficult to drink from.

THE PERFECT DRINKING FOUNTAIN STREAM

is produced by the famous PURITAN Cantonment "2-stream projector" illustrated in connection with our Puritan 605 Fountain. This stream producing device was designed for, approved and adopted by the Government during the war. Now recognized as superior by the largest interests and schools in the country.

EXCLUSIVE FEATURES

Practical drinking stream!
Automatic stream control—
Stream is never too high. Never too low.

Puritan CANTONMENT DRINKING FOUNTAINS

Write for illustrated literature

Puritan No. 605 Vitreous China Wall Fountain

THE HALSEY W. TAYLOR CO. - Warren, Ohio

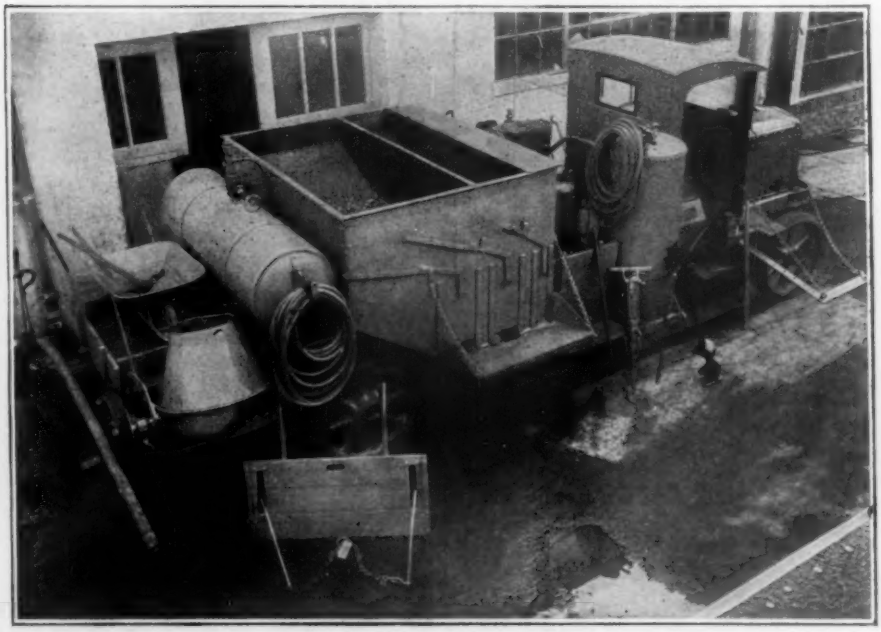
A New Highway Maintenance Truck

The Board of Supervisors of Kern County, Calif., has been using for some time a Fageol highway maintenance truck made by the Fageol Motors Company, Oakland, Calif. This truck was purchased immediately after the demonstration test given at the concrete highway test track, Pittsburg, Calif. Stanley Abel, chairman of the Kern County Supervisors, stated that in one day's operation of this truck 27 patches were made on the highway, and after charging off the very liberal depreciation with full operating expenses, the cost of doing this with the maintenance truck showed a saving of $67 as compared with the cost of the same amount of work done by the usual method. It is expected that this truck will pay for itself within the first year's operation.

The Fageol highway maintenance truck consists of a heavy-duty motor truck equipped with an air compressor with a capacity of 80 cubic feet per minute with air receiver and 200 feet of 1-inch air hose and connections. There are combination material bins having a capacity of 1,000 pounds of cement, 1 cubic yard of sand, 2 cubic yards of gravel or rock, all gravity operated and controlled by hand-operated gates to the mixing apron. The water-tank has a capacity of 150 gallons, and discharge is effected by gravity or pressure. The rotary concrete mixer is driven by an auxiliary shaft from the transmission. The centrifugal pump has a self-priming device and suction hose for filling the water-tank from wells, rivers, and other sources. It has a draw-bar attachment for hauling trailers, and a power-driven niggerhead winch for service when needed. A tar or road oil heating tank with gas burners is included, having a capacity of 50 gallons and equipped with a siphon nozzle for spraying bituminous material under pressure with hose. A large pneumatic jack-hammer with assorted chisels, tampers, etc., a pneumatic post-hole digger and hose, are also provided.

There is an extension side-arm or boom placed at the side of the truck, which is used in hauling a large grading plow with drag or grader when necessary. Additional equipment includes a steel wheelbarrow, one 10-ton jack and bracket, 200 feet of 1-inch manila rope, 25 feet of tow chain, steel stencils for lettering highways, three shovels, two picks, one large sledge, two crowbars, ten red lanterns, ten "At Work" signs and ten red flags.

The truck is thus fully equipped for repairing ruptures or breaks in reinforced or plain concrete, macadam or various bituminous types of streets, as well as erecting fences, assisting in the construction or repair of steel, wooden or concrete bridges and culverts, beveling, grading, and other maintenance jobs on highways, stenciling traffic or ordinance signs, chipping out cracks on concrete highways and sealing with hot bituminous material under pressure, cutting asphalt paving with the pneumatic chisel or jack-hammer, spraying trees and shrubbery in parks with fungicide, and putting out fires along highways. With suction hose and centrifugal pump it can be used to good advantage in pumping out caissons, etc.



THE ROAD MAINTENANCE TRUCK WITH ALL EQUIPMENT SHOWN

PROTECTION

A Standard System of Protective Service Meter Switches

WK-54 Switch equipped porcelain bus-connector block.

WK-54 Switch with meter end arranged for Westinghouse Type OA Watt-hour Meter.

Showing method of banking Switches.

WK-54 Switch equipped with bus-connector straps.

The line of Westinghouse Type WK-54 service meter switches represents a standard system of entrance switches. These switches were designed to meet Central Station demands. Also they afford protection to the service and watt-hour meters by preventing interference or tampering by anyone not authorized to care for them. Testing of the meters can be done with dispatch and without interfering with the consumer's use of his installations.

The terminal chamber of the meter and all the wiring is enclosed in a metallic enclosure under one cover. The switch is operated from the outside, so that it is unnecessary to disturb the seal on the box or open the cover to operate the switch.

There is ample space in the box for wiring.

Removable knockouts (U sides) are provided in each side of the box to permit the use of wiring troughs for banking meters.

The ends of the box are made to receive all makes of end walls or meter trims for this type of equipment.

A grounding connection is placed inside each box.

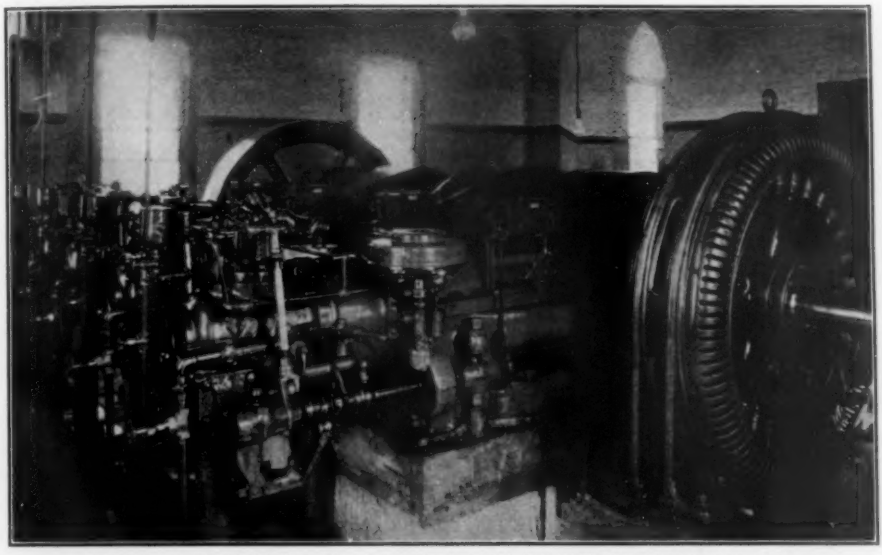
Furnished in capacities of 30, 60 and 100 amperes.

Type WK-54 Service Motor Switches are fully described in Catalogue 12-A

Westinghouse Electric & Manufacturing Company

Krantz Works, 160 Seventh St., Brooklyn, N. Y.

Westinghouse



A 120-H. P. ST. MARYS FUEL OIL ENGINE INSTALLATION IN AUBURN, NEBR.

A New-Principle Diesel Oil Engine

A Diesel engine without the usual air compressor piping, air receivers and needle valves, has quite recently been placed on the market by the St. Marys Oil Engine Company, St. Charles, Mo. The fuel for this engine is not atomized by means of compressed air, as in most Diesel types, but by partial explosion in the cup. The cost of production claimed by the manufacturer is from 20 to 30 per cent less than that of the standard type of fuel oil engines. This is caused by discarding the high-pressure compressor with its piping and receivers, the fuel pump with piping and needle valves, and the expense of erecting these parts.

In operating a 60-horse-power St. Marys engine for 300 10-hour days, approximating one year, the total cost for fuel at 5 cents per gallon is about $660.30. An interesting installation of these engines is found in the municipal power-plant at Grafton, Ill., where two 30-horse-power St. Marys engines are running two 2,300-volt, 37½-kw. generators. The night load requires the two engines to furnish the required current. No difficulty has been experienced, according to statements of the officials, in starting the engines, and in five minutes they have been able to handle the full load, using about 2 gallons of fuel oil to the engine per hour when operating at full load.

Blackstead Joins Dayton-Dowd

The Dayton-Dowd Company, Quincy, Ill., has recently announced that A. P. Blackstead has joined its engineering staff in the manufacture of centrifugal pumps and fire pumps. Mr. Blackstead was formerly Chief Engineer of the Camden Iron Works, and prior to that, Hydraulic Engineer with the Henry R. Worthington Company, of New York. He has just returned from Europe, where he spent six months studying conditions and investigating recent developments in hydraulic engineering.

Whitten Opens Cleveland Office

Robert Whitten has announced that he has opened offices at 4614 Prospect Avenue, Cleveland, Ohio, for the professional practice of city planning and city zoning. He will undertake commissions from municipalities and civic organizations for the preparation of comprehensive city plans and their special features, such as zoning plans and ordinances, major street or thoroughfare plans, traffic regulations and ordinances, park and boulevard plans, building line, bill-board and smoke prevention ordinances, and regulations for the approval of plats of land subdivisions.

Pennsylvania State Contract for Culverts

The Canton Culvert & Silo Company, Canton, Ohio, manufacturers of Acme nestable and Imperial riveted corrugated metal culverts, have been awarded the contract for supplying the Pennsylvania State Highway Department's requirements for corrugated metal culverts for this season, as last. The contract approximates 42,000 feet of corrugated culverts.

Central Foundry Moves Up-Town

The Central Foundry Company, manufacturers of Universal cast iron pipe, formerly located at 90 West Street, New York City, have moved up-town to 41 East 42d Street.

Placing a 12" 45-ft. JOHNSON Brass Well screen in the well.

Why do they?

There is a free sample waiting for every interested person who wants to know *why* Johnson Brass Well Screens have them all beat for capacity. If you are one of these persons tell us and we will see that you get yours.

When you plan your well have the screen with the continuous inlet slot where you can look at it. You will see one-half more active intake area and a real honest completely undercut intake slot.

The sample shows in a way which cannot be disputed just why the Johnson is the most valuable well screen. Send for it now.

Edward E. Johnson, Inc.

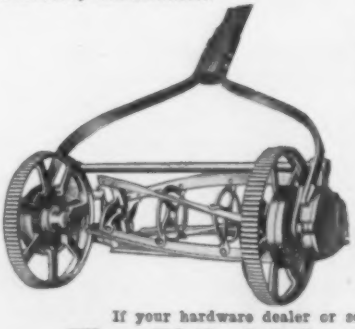
St. Paul, Minn.

GENUINE

"PHILADELPHIA"

LAWN MOWERS

Style "GRAHAM" all steel.
Style "A" all steel.
Practically Indestructible.



LARGEST MAKERS OF HIGH GRADE LAWN MOWERS IN THE WORLD.

and more people have bought and are buying, using and recommending the GENUINE "PHILADELPHIA" Lawn Mowers than any other make.

The famous Vanadium Crucible Steel Blades and the Bearings bored to rifle barrel accuracy, are features that have made the name "PHILADELPHIA" worth remembering when buying Lawn Mowers.

So great is the demand we are compelled to make "PHILADELPHIA" Mowers in

18 Styles HAND, 4 Styles HORSE, 3 Styles MOTOR

ALL HIGHEST GRADE POSSIBLE TO BUILD
A MOWER FOR EVERY PURPOSE

Send for catalog NOW.

If your hardware dealer or seedman cannot supply you, send to us direct.

The Philadelphia Lawn Mower Company

31ST AND CHESTNUT STS., PHILADELPHIA, U. S. A.

Tubular Steel Lamp Standards

There has been much talk about the danger of shattering street lighting standards by trucks or automobiles which are intentionally steered over the curb line to prevent collision with other vehicles or pedestrians. To overcome these objections the Electric Railway Equipment Company, Cincinnati, Ohio, has brought out the Safety First standard which is illustrated herewith. This standard is claimed to be practically unbreakable, as the shafts are made from open-hearth, lap-welded steel tubes, having a tensile strength of over 50,000 pounds per square inch and assembled with a patented "wire lock" joint. The standard illustrated is equipped with a General Electric Form 8 Novalux top and measures 10 feet 6 inches from the ground line to the center of the light source. The base is 13 inches in diameter and the shaft 4½ and 3½ inches in diameter.

A Lighting Standard Difficult to Shatter

New Central Station for Amory, Miss.

A bond issue of $90,000 has been authorized to finance a new complete light, water and power plant in Amory, Miss. The new power-plant machinery will consist of one 3-cylinder, 175-b.h.p. engine, and one 4-cylinder, 225-b.h.p. engine, both of the vertical 4-cycle Fulton Diesel type made by the Fulton Iron Works Company, St. Louis, Mo. The smaller engine will be direct-connected to a 146-kv.-amp., 117-kilowatt, 8 P.F., 2,300-volt, 60-cycle, 3-phase, alternating-current generator with belted exciter. The larger engine will be direct-connected to a 187½-kv.-amp. generator of the same type with belted exciter. A well-lighted brick and concrete building of ample size is to be erected for the new machinery, and space will be provided for a future third Diesel engine.

It is interesting to note that although Amory is nearer to the coal fields than to the oil fields, it was shown by F. G. Proutt, of Memphis, Tenn., city consulting engineer, that with Diesel engines the net income on the light, water and power system would be more per dollar invested than with any other type of equipment.

Hotel Financing

The modern hotel is becoming more and more not only a community social center, but the symbol of the type of hospitality the community extends to the traveler. The present is by no means a stay-at-home generation. Improved highways carry an increasing number of travelers over the country, making hotels a distinct asset to a municipality. As travel has increased, there has been a growing tendency to classify cities upon the basis of their hotels. The public, as a result of its journeying, has come to realize the truth of Samuel Johnson's observation that "there is nothing which has been conceived by man by which so much happiness is provided as by a good tavern or inn."

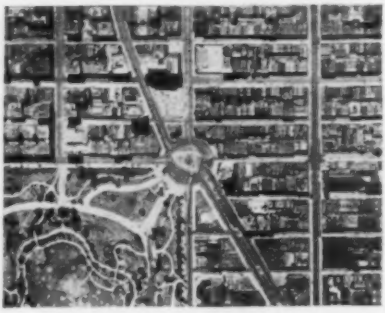
Community financing in connection with hotel promotion is coming rapidly to the front as an accepted procedure. An increasing number of cities and towns are taking pains to protect their good names by establishing a community interest in the hotels that represent them. In this connection the announcement that Harvey J. Hill and Arnaud C. Marts have retired from the firm of Ward, Hill, Pierce and Wells, and formed the Hotel Financing Company, 1 Madison Avenue, New York City, in order to devote themselves to the work of financing hotels upon the basis of community participation.

The modern hotel is a force for democracy whose importance and influence few of us fully realize. A list of the events scheduled at many of our hotels in wide-awake communities indicates the great range of their local service. Practically every sort of organization, from a chamber of commerce to a literary society, makes the hotel its regular meeting-place. In addition, the modern hotel is the scene of innumerable social functions. Whatever may be the limitations imposed on the modern flat-dweller by the housing problem, the hotel offers to all members of the community alike opportunities and accommodations for sociability appreciated by the individual, as well as necessary to folks in the mass. The hotel has made it possible to overcome many social difficulties that would otherwise be insurmountable.

This is only one phase of the service rendered by hotels from the community point of view. It would be quite enough to stimulate community interest in the hotel were there no other basis for it. But the hotel is the right hand that each community extends to welcome the stranger within its gates. It is possible for a poor hotel to undo in five minutes all that the community boosters have accomplished in the space of a year. Community-promoted hotels are now recognized institutions, and conservative, dependable methods of financing them are a distinct contribution to community welfare.

General Chemical Moves Office

The General Chemical Company, manufacturers of Hard-n-Tyte, a chemical for producing stronger concrete, have moved their offices from the Broad Exchange Building, New York City, to 40 Rector Street.



A reduced section of the New York City Mosaic Map showing Columbus Circle district.

The Fairchild Aerial

MOSAIC MAP

—a new big factor in city development plans

A Mosaic Survey is made by taking and assembling a series of overlapping vertical aerial photographs, resulting in a complete map, perfect in detail and mosaic in character.

The City of Newark, N. J., has recently contracted for a Fairchild Aerial Mosaic Survey because copies of the map will prove an invaluable aid to:

1. City Plan Board
2. City Engineer
3. Tax Assessor
4. Schools
5. Police and Fire Department
6. Building Department
7. Bureau of Information
8. Civic Organizations

DO THIS TODAY—Write for large gravure reproduction of New York Mosaic Survey — and one of the sectional photographs used in making this map. Sent **FREE** to any interested official.

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CITY MANAGER, CITY ENGINEER, OR CHIEF ENGINEER

Engineer of long and varied executive experience wishes position as City Manager or City Engineer, or as Chief Engineer or Supt. of municipal department or private corporation. 14 years executive head and chief engineer of large department in city of over 500,000 and of an Industrial and Power Co. 12 years' practice as consulting civil, hydraulic, sanitary, and power engineer. Address Box 89, The American City, Tribune Bldg., New York City.

REGISTERED ENGINEER

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Well qualified in municipal engineering, wishes new location. Five years' intensive experience in water works, sewerage, sewage disposal and the preparation of plans, drawings, specifications, and estimates for pavements, side walk, bridges, surveys, and the preparation of contracts.

Box 90, The American City, Tribune Bldg., New York City.

Wanted

Applications for City Manager by the

City of Onaway, Mich.

WILL B. GREGG,
City Clerk.

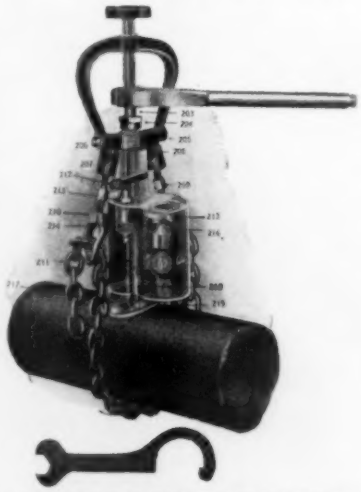
CITY MANAGER OR CHAMBER SECRETARY AVAILABLE

A high grade, public spirited man, 32 years old, university graduate, widely experienced in newspaper, publicity and organization work, is available for city manager or chamber of commerce work. Box 88, care American City, Tribune Bldg., New York.

A Tapping Machine for Water-Mains

The tapping machine illustrated herewith is the invention of Walter S. Payne, who for a number of years was a Superintendent of Water-Works and has been for a long time in the business of manufacturing water-works supplies. This new Eclipse tapping machine is made by the Hays Manufacturing Company, Erie, Pa. It is claimed that this machine has reduced the process of tapping water-mains under pressure to its simplest form, as there are no valves or pet-cocks to get out of order, and no revolving heads to get sprung or joints to leak. The pressure or strain of the feed screw pulls directly on the chain, thereby relieving the machine of undue strain. The machines are made of bronze metal with saddles of malleable iron.

In using this machine, the corporation cock is screwed into the mandrel or bushing by means of a spanner wrench which goes with each machine for this purpose. Then by means of a handle the crane is swung around over the opening in the bottom of the machine, and the mandrel is screwed firmly into the crane by means of the wrench. The crane, with the mandrel and cock in it, is then swung around into the recess, and the handle is folded up to prevent the crane from swinging back. Following this, the combined tap and drill is put into the machine. The saddle, with a gasket under it, is put onto the main, and with another gasket in the saddle the machine is set onto the saddle. The tightening bolts are unscrewed far enough out of the clevis and harp to give room for taking up all slack in the chain. The ends of the chain are passed through the harps and then the chain is tightened by means of a wrench applied to the tightening bolt. These bolts have a right-hand thread at one end and a left-hand thread at the other, so that they tighten up rapidly. When this is done, the ratchet is put on the drill, and the feeder yoke is swung into position. Then the feeder screw is tightened until there is the proper pressure on the drills. After the hole is drilled and tapped, the tap is drawn up into the machine as far as possible through the stuffing box. The handle is then opened and the crane swung around so that the cock and mandrel come immediately under the tap and drill. Then the operator pushes down on the tap and drill and screws it into the mandrel until it is tight, continuing until it unscrews the mandrel out of the crane. When it is thus released, the cock is pushed down into the opening in the main and screwed in by means of the tap, using a ratchet to turn it in. The chain is then loosened and the machine taken off, a wrench is put onto the cock, screwing it into the main securely, and then the tap and mandrel are unscrewed from the cock.



A MACHINE FOR TAPPING WATER-MAINS

Kelly-Springfield Changes Sales Policy

The Kelly-Springfield Tire Company has recently consolidated its general offices in the new building at 250 West 57th Street, New York City. The New York Branch has been removed to the company's warehouse at 553 West 57th Street, New York City, which is equivalent to giving up the branch altogether, since it has no display rooms, sales counters or any of the other appurtenances of the usual tire store. The company has discontinued all retail sales in order to protect dealers.

The company intends to establish warehouses in various centers of distribution where railroad facilities are best suited to give prompt service to its dealers. In places where it now maintains branches, these will be supplanted by offices, which in many cases will be in the warehouses themselves.

Benham Engineering Company

Webster L. Benham has announced that under the firm name of Benham Engineering Company, Consulting Engineers, 215 Gumbel Building, Kansas City, Mo., he has taken over all contracts of Benham & Mullergren and will continue to act as a consulting engineer on water-works, sewers and sewage disposal, electric light and power plants, street paving and valuations. A. L. Mullergren retires from the firm and will engage in private practice, specializing in electric light and power plant engineering and public utilities, with his office at 555 Gates Building, Kansas City, Mo.

New Pumper for Nashville, Tenn.

We acknowledge an error appearing on page 204 of the April, 1922, issue of THE AMERICAN CITY, where a notice was given of a 1,300-gallon Ahrens-Fox auto pumping engine delivered to Newport, Ky. This should have read Nashville, Tenn. The tractor for the aerial truck was delivered to Newport, Ky.

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